

**DRAFT**

**AREA 2 FIELD SAMPLING PLAN**

**ADDENDUM TO REMEDIAL INVESTIGATION**

**WORK PLAN**

**FOR PER- AND POLYFLUOROALKYL SUBSTANCES**

**(PFAS)**

**FORMER FORT DEVENS ARMY INSTALLATION, DEVENS, MA**

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**SEPTEMBER 2018**

**Prepared for:**  
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**Concord, Massachusetts**

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### **NOTICE**

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**Draft**  
**Area 2 Field Sampling Plan**  
**Addendum to the Remedial Investigation Work Plan**  
**for Per- and Polyfluoroalkyl Substances (PFAS)**  
**Former Fort Devens Army Installation**  
**Devens, Massachusetts**

**September 2018**

**CERTIFICATION:**

I hereby certify that the enclosed Report, shown and marked in this submittal, is that proposed to be incorporated with Contract Number W912WJ-18-C-0011. This document was prepared in accordance with the U.S. Army Corps of Engineers (USACE) Scope of Work and is hereby submitted for Government approval.

**Reviewed By:**



**9/25/18**

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## ACRONYMS AND ABBREVIATIONS

|         |   |
|---------|---|
| AAFES   | Army Air Force Exchange Service   |
| AFFF    | aqueous film-forming foam   |
| AOC     | Area of Contamination   |
| bgs     | below ground surface  |
| cm/sec  | centimeter per second   |
| COC     | contaminant of concern  |
| CSM     | conceptual site model   |
| Devens  | former Fort Devens Army Installation  |
| DOC     | dissolved organic carbon  |
| DPT     | direct push technology  |
| DPW     | Department of Public Works  |
| DQO     | data quality objective  |
| DRMO    | Defense Reutilization and Marketing Office  |
| FSP     | Field Sampling Plan   |
| ft      | feet/foot   |
| HERA    | Draft Baseline Human Health Risk Assessment and Screening Level<br>Ecological Risk Assessment |
| IDW     | investigation derived waste   |
| KGS     | KOMAN Government Solutions  |
| LHA     | lifetime health advisory  |
| LTM     | long-term monitoring  |
| MassDEP | Massachusetts Department of Environmental Protection  |
| MNA     | monitored natural attenuation   |
| ng/L    | nanograms per liter   |
| NIA     | North Impact Area   |
| ORSG    | Office of Research and Standards Guideline  |
| PA      | Preliminary Assessment  |
| PFAS    | per-and polyfluoroalkyl substances  |
| PFHpA   | perfluoroheptanoic acid   |
| PFHxS   | perfluorohexane sulfonic acid   |
| PFNA    | perfluorononanoic acid  |
| PFOA    | perfluorooctanoic acid  |
| PFOS    | perfluorooctanesulfonic acid  |
| POL     | Petroleum, Oil, and Lubricants  |
| QC      | quality control   |
| RI      | Remedial Investigation  |
| ROD     | Record of Decision  |



## ACRONYMS AND ABBREVIATIONS

|          |   |
|----------|---|
| RQD      | rock quality designations                                   |
| SHL      | Shepley's Hill Landfill                                     |
| SI       | Site Inspection   |
| SOP      | standard operating procedure                                |
| SSL      | site-specific screening level                               |
| TOC      | total organic carbon  |
| TOP      | total oxidizable precursor                                  |
| UFP-QAPP | Uniform Federal Policy Quality Assurance Project Plan       |
| USACE    | United States Army Corps of Engineers, New England District |
| USEPA    | United States Environmental Protection Agency               |
| UST      | underground storage tank                                    |
| µg/Kg    | micrograms per kilogram                                     |

## **1.0 INTRODUCTION AND BACKGROUND**

This Field Sampling Plan (FSP) for Area 2 at Former Fort Devens Army Installation (Devens) located in Devens, Massachusetts has been prepared by KOMAN Government Solutions (KGS) on behalf of the United States Army Corps of Engineers, New England District (USACE) and has been generated as an addendum to the *Draft Remedial Investigation Work Plan for Per- and Polyfluoroalkyl Substances (PFAS)* (KGS, 2018a). Area 2 consists of Areas of Contamination (AOC) 05, 32/43A, 43G, 43J, and 76 at Devens as well as the MacPherson water supply well investigation area (Figure 1). The other AOCs and areas of investigation for the Remedial Investigation (RI) will be addressed as part of Area 1 and Area 3 FSPs. Areas 1, 2, and 3 were designated for sequencing of field activities and do not represent prioritization.

A base-wide Preliminary Assessment (PA) for per- and polyfluoroalkyl substances (PFAS) was completed in 2017 (KGS, 2017) that identified several AOCs at Devens where aqueous film-forming foam (AFFF), which is a source of PFAS, was stored, used, or released. A Site Inspection (SI) (BERS-Weston, 2018b), a one-time sampling of existing long-term monitoring (LTM) wells (KGS, 2018b), and SI Addendum (BERS-Weston, 2018a) were subsequently completed and concluded that PFAS are present in groundwater and soil at several AOCs in Area 2. In addition, PFAS have been detected in the MacPherson water supply well, which is located on Devens (Figure 1). Therefore, the Army is conducting an RI under the Comprehensive Environmental Response, Compensation, and Liability Act to determine the nature and extent of PFAS in groundwater, soil, surface water, and sediment at AOCs 05, 32/43A, 43G, 43J, and 76 at Devens, to determine whether sources at Devens are impacting public water supply wells, and to evaluate whether PFAS are present in environmental media at Devens at concentrations that pose an unacceptable risk to human health or the environment.

## **2.0 OBJECTIVES**

The purpose of this FSP is to provide the sampling design and rationale associated with each AOC for Area 2 and is intended to be used in conjunction with the RI Work Plan (KGS, 2018a) and the project Uniform Federal Policy Quality Assurance Project Plan (UFP-QAPP) [Appendix A of the RI Work Plan (KGS, 2018a)]. This FSP has been developed to support the study goals, questions and decision statements summarized in Worksheet #11 (Data Quality Objectives) of the UFP-QAPP. All of the PFAS UFP-QAPP worksheets referenced in this FSP are provided in Appendix A of this FSP. A conceptual site model (CSM) for the presence of PFAS in the environment at Devens and potential exposure pathways are provided in Section 3 of the RI Work Plan. AOC-specific CSM details are provided in Section 5.0 of this FSP.

## **3.0 PROJECT ORGANIZATION AND RESPONSIBILITIES**

The organizational structure for the PFAS RI at Devens is provided in combined Worksheet #3 and #5 (Project Organization and UFP-QAPP Distribution) of the UFP-QAPP. Personnel qualifications for key project personnel are summarized on combined Worksheet #4, #7, and #8 (Personnel Qualifications) of the UFP-QAPP. Communication pathways are provided in Worksheet #6 (Communication Pathways) of the UFP-QAPP (Appendix A).

## **4.0 GENERAL REMEDIAL INVESTIGATION APPROACH**

This section provides a general overview of the RI approach at Area 2. A discussion of the CSM and data quality objectives (DQO) for PFAS at each AOC as well as figures and tables that provide the sampling plan for each AOC, are provided in Section 5.0 of this FSP. Requirements for

collection of field quality control samples are discussed in Section 6.0. A listing of field standard operating procedures (SOP) applicable to the Area 2 investigation is provided in Section 7.0. Sample packaging and shipping requirements are summarized in Section 8.0. Management of investigation-derived waste (IDW) is summarized in Section 9.0 and processes for field assessment and corrective actions are presented in Section 10.0.

Field work in RI Area 2 will be conducted using an approach that will allow for timely collection, receipt, and review of data that will be incorporated into the CSM for each AOC and that will help guide additional field activities, if needed. The investigation program is intended to be dynamic such that the initial proposed activities will be completed, and the results provided and discussed with the U.S. Environmental Protection Agency (USEPA) and Massachusetts Department of Environmental Protection (MassDEP) to expedite selection and implementation of additional activities needed to achieve the study goals and DQOs specified in UFP-QAPP Worksheet #11 (Data Quality Objectives) at Area 2 (Appendix A). A scoping meeting was conducted on August 29, 2018 to discuss sampling locations with the base closure team and stakeholders for Area 2.

#### **4.1 Evaluation of Previous PFAS Results**

The PFAS groundwater and soil data obtained during the SI (BERS-Weston, 2018b), a one-time sampling of existing LTM wells (KGS, 2018b), and SI Addendum (BERS-Weston, 2018a) were used to develop the sampling plan for Area 2. No surface water or sediment samples were collected from Area 2 surface water bodies during the SI or SI addendum (BERS-Weston, 2018b and 2018a) or the LTM sampling (KGS, 2018b).

Historic PFAS groundwater results at Area 2 AOCs are compared to the USEPA Lifetime Health Advisory (LHA) of 70 nanograms per liter (ng/L) for the sum of perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA).

#### **4.2 Groundwater Investigation**

An extensive groundwater monitoring well network is available at many of the AOCs being investigated at Area 2. Whenever possible, existing monitoring wells will be sampled for PFAS analysis to provide data regarding the extent of PFAS in groundwater at Devens. The existing groundwater monitoring well network will be augmented with groundwater vertical profile sampling (“profiling”) involving direct push technology (DPT) and/or possibly sonic drilling technology, both of which are proven to provide representative groundwater samples that will support the objectives of this RI, as outlined in Section 2.0 of the RI Workplan (KGS, 2018a). The groundwater vertical profiling will be conducted in conjunction with sampling of existing monitoring wells to delineate PFAS groundwater contamination vertically and laterally in the aquifer.

#### **4.3 Soil Investigation**

Surface and subsurface soil samples will be collected for PFAS analysis from the unsaturated zone to identify and/or confirm the location of potential PFAS source areas that have been tentatively identified at AOC 76 in the SI Addendum (BERS-Weston, 2018a). While PFAS have been reported in groundwater at AOCs 32/43A, 43G, 43J and at the MacPherson municipal water supply well, a potential source for PFAS groundwater contamination was not identified. For these AOCs where groundwater contamination has been reported but no known source has been identified, the additional groundwater data collected during this RI will be reviewed to identify unknown source areas that may potentially be located at Devens. If the groundwater data indicate a previously

unidentified source area at Area 2, additional soil sampling may be completed to define the nature and extent in soil and provide data that can be used in support of the Risk Assessment.

At AOC 05, based on the lack of known use of AFFF at SHL and a review of the groundwater results obtained during the SI (BERS-Weston, 2018b) and LTM sampling (KGS, 2018b) the presence of low concentration PFAS in groundwater within SHL is not attributed to a specific point sources involving past activities associated with the use of AFFF (i.e., fire training, hose cleaning, etc.). Therefore, soil sampling at AOC 05 is not planned at this time. However, if groundwater data indicate that a potential point source area within the landfill is present, advancement of soil borings may be considered.

#### **4.4 Surface Water and Sediment Investigation**

Collection of surface water and sediment samples from Area 2 surface water bodies was not conducted during the SI or SI addendum (BERS-Weston, 2018b and 2018a) or LTM sampling (KGS, 2018b). To date, no surface water or sediment samples have been collected at Area 2 for PFAS analysis. Therefore, a network of collocated surface water and sediment samples has been developed for Area 2 aquatic systems to determine if PFAS are present in these media. The locations and number of samples within each aquatic system were selected for two purposes: 1) to determine if PFAS are present in areas most likely to be impacted by PFAS originating (either through groundwater discharge or overland flow of contaminated surface soils and/or AFFF) from the Area 2 AOCs, and 2) determine if PFAS are present in surface water and sediment at locations upgradient and downgradient of AOCs (for rivers and streams) or along shoreline of ponds that are more distal from the AOCs.

If PFAS are detected in surface water and/or sediment at concentrations that represent a potential risk to human health and the environment (i.e., concentrations greater than the USEPA site-specific screening levels (SSLs) [USEPA, 2018] or ecological screening levels presented in the Draft HERA Work Plan [KGS, 2018d]), then additional sampling of surface water and sediment may be conducted near areas of potential risk that were identified.

#### **4.5 Initial Data Review**

The results from groundwater vertical profiling, soil sampling, sampling of existing monitoring wells, and surface water and sediment sampling at Area 2 will be evaluated in coordination with USEPA and MassDEP to determine if the vertical and lateral extent of PFAS in environmental media have been adequately delineated. If significant data gaps in the extent of PFAS are identified, then additional activities will be completed to address data gaps. If additional potential point sources or secondary sources, such as sewer lines and storm water drainage systems are identified through review of the results, then additional groundwater vertical profiling and/or soil sampling may be completed to further delineate the nature and extent of PFAS related to these potential sources.

#### **4.6 Monitoring Well Installation**

The Army plans to install overburden monitoring wells in Area 2 following a review of the PFAS data obtained from groundwater vertical profiling, soil sampling, and existing monitoring wells, which will aid in determining the location and screen settings of the permanent monitoring wells. Tentative well locations are shown on figures, but actual well locations will be determined based on review of data and discussion with the regulatory agencies. The PFAS groundwater monitoring network will be designed to monitor PFAS concentrations within and bounding potential plumes

identified through the groundwater vertical profiling and existing monitoring well sampling effort associated with this RI. The wells will be installed through drive and wash drilling.

During advancement of borings for permanent monitoring well installations, continuous soil cores collected from the water table to the bottom of the boring will be logged for field lithologic classification at select locations and select soil samples will be collected from the saturated zone. This logging/sampling will provide for further evaluation of hydrogeology and PFAS fate and transport. In addition to field descriptions of soil characteristics, a select subset of soil samples will be collected for grain size, total organic carbon (TOC), and total oxidizable precursor (TOP) assay analysis. These borings and well installations will be conducted using DPT and/or sonic drilling technology. These technologies provide for continuous soil logging and sampling, as needed during borehole advancement.

#### **4.7 Baseline Sampling of New Monitoring Wells**

After new monitoring wells are installed and developed, a synoptic water level measurement event will be conducted for Area 2 to evaluate groundwater flow within and between each AOC. The synoptic water level event will consist of monitoring water levels at a combination of new and existing monitoring wells. The specific wells for the synoptic water level event will be determined after the locations and screen settings of the new monitoring wells are determined. In addition, one round of groundwater samples will be collected from the new monitoring wells and analyzed for PFAS. A subset of samples from select wells in areas of high PFAS concentrations will also be sampled for dissolved organic carbon (DOC) and total oxidizable precursor (TOP) assay analysis to evaluate the fate and transport of PFAS and assess potential for total PFOS and PFOA mass in each sample through evaluation of the presence of compounds that biotransform into fully fluorinated PFAS compounds including PFOS and PFOA. These data will be used to assess the potential for continuing sources.

#### **4.8 Sampling of Water Supply Wells**

Sampling of public or private water supply wells may be completed in support of the RI, if, during completion of the above RI activities, a potential migration pathway to public or private water supply wells located beyond Devens is identified.

### **5.0 FIELD ACTIVITIES BY AREAS OF CONCERN/AREAS OF INTEREST**

#### **5.1 AOC 05**

##### **5.1.1 Introduction/ Conceptual Site Model Discussion**

AOC 05 was not identified during the base-wide PFAS PA (KGS, 2017) as an area of known use, storage, or disposal of AFFF. However, it was included in the SI due to its historical use as a municipal landfill that may have received materials containing PFAS. Shepley's Hill Landfill (SHL) is located in the northeast corner of the former Main Post of Fort Devens and occupies 84 contiguous acres (Figure 1). The landfill is bordered to the east by Plow Shop Pond and land formerly containing a railroad roundhouse, to the west by Shepley's Hill, to the south by recent commercial development and AOC 32, and to the north by wooded and residential areas. Nonacoicus Brook, which drains Plow Shop Pond to the Nashua River, is located north of the landfill, and is identified as the northern boundary of what is called the North Impact Area (NIA) (i.e., the area downgradient of the landfill with groundwater that is believed to have been impacted by the presence of SHL).

An extensive overburden and bedrock monitoring well network occupies much of AOC 05. Groundwater flow direction in the overburden and bedrock at Shepley's Hill has been extensively studied (Geosyntec, 2018). Groundwater flow direction in the southern portion of the landfill is generally to the east/northeast toward Plow Shop Pond. Groundwater flow in the middle portion of the landfill is also generally to the northeast, toward Plow Shop Pond. An impermeable barrier wall was installed in 2012 west of Plow Shop Pond to mitigate the arsenic flux to Red Cove/Plow Shop Pond by groundwater flow from the SHL. Groundwater flow in the northern most portion of the landfill is to the north toward Nonacoicus Brook. Groundwater flow beyond the northern limits of the landfill is generally to the north toward Nonacoicus Brook. The generalized groundwater flow direction at AOC 5 is shown on Figure 2.

### **5.1.2 Previous PFAS Sampling**

As part of the SI (BERS-Weston, 2018b) and LTM sampling (KGS, 2018b), samples were collected from a total of 25 groundwater monitoring wells and two extraction wells within SHL and the NIA to assess potential PFAS impacts to groundwater. PFAS were detected in the influent to each extraction well, but at concentrations that were less than the LHA.

PFAS concentrations greater the LHA were detected at two of 25 monitoring wells sampled during the SI and LTM sampling. The LHA exceedances in groundwater were reported in monitoring wells located to the northeast and north of the landfill. The data from previous sampling events are shown on Figure 2.

### **5.1.3 Remedial Investigation Approach/Sampling Plan**

Due to the extensive groundwater monitoring well network that exists at AOC 5, the PFAS remedial investigation at AOC 5 will rely on the existing monitoring well network to the maximum extent possible to better define the vertical and lateral extent of PFAS in groundwater at AOC 5 and characterize groundwater in this area that originates from SHL and Plow Shop Pond. No new monitoring well installations are proposed for this AOC. The groundwater data set will be augmented with surface water and sediment samples to be collected from Plow Shop Pond and Nonacoicus Brook. Details on the sampling plan for AOC 5 are provided below.

#### **5.1.3.1 Groundwater Sample Collection**

A network of existing monitoring wells will be sampled for PFAS analysis to further define the vertical and lateral distribution of PFAS in groundwater in areas where PFAS concentrations are exceeding the LHA or are approaching the LHA. The locations of monitoring wells to be sampled for PFAS analysis are shown on Figure 2. A listing of existing wells at AOC 5 to be sampled during the RI, including well construction information, is provided in Table 1. The sampling nomenclature and analytical scope is provided in Table 2.

Groundwater samples will be collected from existing monitoring wells for PFAS analysis using technical procedures specified in Section 6.0 of this FSP and Worksheet #21 of the UFP QAPP. Field quality control samples, such as field duplicate and field blanks will be collected at a frequency as specified in Worksheet #20 of the UFP-QAPP (Appendix A).

#### **5.1.3.2 Surface Water and Sediment Collection**

Collocated surface water and shallow sediment samples, involving cores (0 to 6 inches), will be collected from six locations in Plow Shop Pond and at seven locations along a run of the Nonacoicus Brook between Plow Shop Pond to the Nashua River to determine if PFAS are present

in surface water and sediment at these surface water features (Figures 1, 2, 10, and 11). If a potential for human health and/or ecological risks are identified (i.e., PFAS are present at concentrations greater than USEPA SSLs [USEPA, 2018] or ecological screening values presented in the HERA Work Plan [KGS, 2018d]), additional surface water and sediment sampling may be needed to identify which areas of Plow Shop Pond or Nonacoicus Brook are contributing the greatest risk.

Surface water and sediment samples will be analyzed for PFAS by isotope dilution (analyte list in QAPP Worksheet #15), TOC, and grain size. Field quality control (QC) samples will be collected at a frequency specified by Worksheet #20 of the UFP-QAPP (Appendix A). Sample collection procedures are provided in Worksheet #21. The sampling nomenclature for each surface water and sediment location and the quality control samples are provided in Table 3. In addition, Table 3 provides direction on whether surface water and sediments should be collected from the shoreline or main channel of a surface water system. The Nonacoicus Brook is surrounded by relatively wide wetland systems and in general, surface water and sediment associated with the main river channel will be assessed. However, at a couple of locations along the Nonacoicus, samples will be collected from the shoreline of the wetland system to assess surface water and sediment where groundwater impacted by SHL is maybe discharging to the wetland.

#### **5.1.3.3 Soil Sample Collection**

As discussed in Section 4.3, soil sampling within the landfill is not planned at this time. SHL was not identified as an area of known use, storage, or disposal of AFFF (KGS, 2017). No exceedances of the LHA were reported at monitoring wells located within landfilled material at SHL. Based on the lack of known use of AFFF at SHL and a review of the groundwater results obtained during the SI (BERS-Weston, 2018b) and LTM sampling (KGS, 2018b) the presence of low concentration PFAS in groundwater within SHL is not attributed to a specific point sources involving past activities associated with the use of AFFF (i.e., fire training, hose cleaning, etc.). However, if groundwater data indicate that a potential point source area within the landfill is present, advancement of soil borings may be considered.

### **5.2 AOC 32/43A**

#### **5.2.1 Introduction/Conceptual Site Model Discussion**

AOC 32 (Former Defense Reutilization and Marketing Office [DRMO] Yard) was used by the Army as an active materials storage facility from approximately 1964 to 1995, where various materials were processed and stored, including a former waste oil underground storage tank (UST). In 1994, an RI was conducted and concluded that soil and groundwater at AOC 32 were impacted by petroleum contamination that was a result of past storage activities in the area (KGS, 2018a). The selected remedy at AOC 32 included excavation and off-site disposal of petroleum contaminated soils with monitored natural attenuation (MNA) and establishment of institutional controls to address residual petroleum contamination in groundwater. The DRMO yard historically consisted of three fenced areas (West Yard, East Yard and Tire Recycling Area), and a former waste oil UST (Figure 3).

AOC 43A (Petroleum, Oil, and Lubricants [POL] Storage Area) served as the central distribution point for all gasoline stations at Fort Devens during the 1940's and 1950's and was subsequently used until the early 1990's to store fuels for various purposes. In 1994, an RI was conducted to determine the nature and extent of petroleum contamination in soil and groundwater at AOC 43A.

The 1998 Record of Decision (ROD) documented the final remedy of MNA with institutional controls to address residual petroleum contamination in groundwater (KGS 2018a).

AOCs 32 and 43A were not identified during the base-wide PFAS PA (KGS, 2017) as an area of known use, storage, or disposal of AFFF. However, at the request of USEPA it was included in the SI (BERS-Weston, 2018b) due to historical storage of materials for recycling.

The Devens Fire Department reportedly applied AFFF to a 2015 warehouse fire at the Devens Recycling Center, which is located to the east and downgradient of AOC 32. Based on a review of site topography, it is possible that AFFF or AFFF-impacted water may have discharged via overland flow to a nearby detention pond during response actions.

Interpretive groundwater flow direction in overburden and bedrock wells at AOCs 32 and 43A are shown in Figures 3 and 4. Groundwater flow paths at AOCs 32 and 43A are complicated by thin glacial overburden over bedrock beneath the area and the steep terrain with exposed bedrock within Shepley's Hill to the west. Previous remedial investigation work completed at AOC 32 indicates that based on bedrock well installation, the bedrock in the area is comprised of Ayer Granite (a granodioritic gneiss) which exhibits few fractures and little weathering (Ecology and Environment, 1994). The Ayer granite was determined to be fairly-competent rock expected to have relatively high rock quality designations (RQD). The report concludes, "the major influence of the bedrock on the hydrology of the area is the control that the top of bedrock has on groundwater flow, because of the contrast in hydraulic conductivity between bedrock and the glacial outwash overburden."

Fairly significant variation in overburden horizontal groundwater gradients, mimicking the geometry of the bedrock surface, are identified. Hydraulic testing indicated an approximate two orders-of-magnitude contrast in average hydraulic conductivity between bedrock and glacial outwash involving  $2.5 \times 10^{-4}$  centimeters per second (cm/sec) and  $1 \times 10^{-2}$  cm/sec, respectively. Silty sand/till hydraulic conductivity averaged  $2.3 \times 10^{-3}$  cm/sec. Permeability of the crystalline rock is related to secondary porosity (presence and interconnectedness of fractures) rather than primary porosity. In some locations the water table is below the top of rock due to generally shallow bedrock depths, lack of primary porosity in the crystalline bedrock, and good interconnection with the much more transmissive glacial overburden above. Consequently, groundwater movement into fractures is expected to reemerge or "daylight" into the increasingly transmissive glacial overburden which thickens over short distances down gradient and away from AOCs 32 and 43A.

In this area, the Shepley's Hill groundwater advective flow model treats shallow bedrock and the glacial outwash as interconnected (Geosyntec, 2018). A study of shallow bedrock within the Ayer granodiorite of Shepley's Hill nearby found a geometric mean hydraulic conductivity of 2.0 ft per day ( $7.1 \times 10^{-4}$  cm/sec) with rising and falling head hydraulic (slug) testing of 15 open boreholes (Gannett Fleming and USEPA Region 1, 2012). Local, shallow bedrock fracture movement of PFAS impacted groundwater from overburden releases which may move into surficial bedrock fractures is expected to result in reemergence of groundwater over short flow paths down gradient into considerably more conductive overburden. This is due to bedrock surface relief, gradients, the hydraulic conductivity contrast, and increasing transmissivity of glacial overburden along flow paths to the north, east, and south. Therefore, bedrock fractures are not considered a significant mode of dissolved contaminant transport from the source areas.

Based on a review of depth to water measurements obtained at LTM monitoring wells, overburden and bedrock groundwater flow direction is variable. Overburden and bedrock groundwater



originating near the UST at AOC 32 migrates to the south/southeast toward the Devens Recycling Center and then flows primarily to the east, downgradient of the Devens Recycling Center (Figures 3 and 4). Overburden and bedrock groundwater near the East and West yards flows to the south toward AOC 43A, where the direction of groundwater flow then becomes primarily to the west. Lastly, overburden and bedrock groundwater north of the Tire Recycling Yard at AOC 32 is predicted to flow to the east and northeast, under the SHL.

### **5.2.2 Previous PFAS Sampling**

Select overburden and bedrock monitoring wells at AOCs 32 and 43A were sampled for PFAS in as part of the SI (BERS-Weston, 2018b) and LTM sampling (KGS, 2018b). Six overburden and two bedrock wells were sampled at AOC 32 and one overburden/bedrock well couplet was sampled at AOC 43A (Figure 5). At AOC 32, PFAS was detected at concentrations that exceed the LHA at one overburden well (32Z-01-07XOB).

At AOC 43A, there were no exceedances of the LHA. The PFAS results from both overburden and shallow bedrock wells at AOCs 32 and 43A can be considered together due to the characteristics of glacial overburden and bedrock in the area described above associated with hydraulics, fracture dominated flow in shallow bedrock, and likely reemergence of shallow bedrock groundwater into glacial overburden (Ecology and the Environment, 1994). The data from previous sampling events are shown on Figure 5.

No soil samples, surface water, or sediment samples were collected at either AOC.

### **5.2.3 Remedial Investigation Approach/Sampling Plan**

The remedial investigation for PFAS at AOCs 32/43A will entail expanding the groundwater PFAS data set at these AOCs by sampling a network of existing overburden and shallow bedrock monitoring wells and/or advancing groundwater vertical profile borings at locations that are crossgradient and downgradient of the PFAS detections. In addition, surface water and sediment sampling, soil sampling (if needed), and installation of a monitoring well network will be completed during this RI. Details on the sampling plan for AOCs 32/43A are provided below.

#### **5.2.3.1 Groundwater Sample Collection**

Due to the variability in the direction of groundwater flow in the area of AOCs 32 and 43A, a synoptic set of groundwater data will be collected from existing groundwater wells to be sampled prior to initiating sampling to provide concurrent data to support evaluation of static water table and the associated flow field within the glacial overburden/shallow bedrock system at the time of sampling. The synoptic data will also be used to evaluate and potentially modify the groundwater vertical profile locations.

A network of wells has been selected at locations that are located upgradient, cross gradient, and downgradient of PFAS groundwater contamination. The locations of monitoring wells to be sampled are shown on Figures 2 and 5. A listing of monitoring wells to be sampled at AOCs 32 and 43A along with the sampling nomenclature and analytical scope are summarized in Table 2 and well construction information is provided in Table 4.

Groundwater samples will be collected from existing monitoring wells for PFAS analysis using technical procedures specified in Section 6.0 of this FSP and Worksheet #21 of the UFP QAPP. Field quality control samples, such as field duplicate and field blanks will be collected at a frequency as specified in Worksheet #20 of the UFP-QAPP (Appendix A). Groundwater samples

will be analyzed for PFAS by isotope dilution (analyte list in QAPP Worksheet #15). The sampling nomenclature and analytical scope for existing monitoring wells is provided in Table 2.

#### **5.2.3.2 Groundwater Vertical Profiling**

Monitoring well data collection will be followed by groundwater vertical profiling at new locations. Six vertical profiles are planned at AOC 32 and three vertical profiles are planned at AOC 43A. Due to the relatively thin nature of the saturated overburden at AOCs 32 and 43A (10 ft to 20 ft) (ABB, 1994) extensive groundwater vertical profiling is not anticipated in areas with existing overburden and bedrock monitoring wells. Instead, groundwater vertical profiling locations at each AOC were selected to define the nature and extent of PFAS in areas downgradient of PFAS groundwater contamination that do not have good monitoring well coverage.

Figures 2 and 5 show proposed vertical profile locations for AOC 32/43A. The rationale for each groundwater vertical profile boring is provided in Table 5. Groundwater vertical profile samples will be collected in 10-ft intervals from water table to rig refusal or the bedrock surface. The depth to water will be measured in accordance with Field Procedure SOP-F0002 (Worksheet # 21 of the UFP-QAPP, Appendix A) at nearby monitoring wells and depth to bedrock will be estimated based on the results of previous remedial investigations completed at AOCs 32/43A (ABB, 1994). If rig refusal is encountered significantly shallower than the anticipated depth to bedrock, one 10-ft step out boring will be conducted. The sampling nomenclature, anticipated depths, and analytical scope are summarized in Table 6.

Groundwater samples will be collected during advancement of the vertical profiling borings using field procedure SOP-F014 (Direct Push Technology) and SOP-F003 (Groundwater Sampling) and SOP-F009 (PFAS Sampling) as listed in Section 6.0 of this FSP and Worksheet #21 of the UFP QAPP. Field quality control samples, such as field duplicate and field blanks will be collected at a frequency as specified in Worksheet #20 of the UFP-QAPP (Appendix A).

#### **5.2.3.3 Soil Sampling**

No potential soil source areas have been identified at AOCs 32 and 43A. In addition, detections of PFAS at concentrations slightly greater the LHA have been reported in only one monitoring well sampled in this area. Due to the lack of reported AFFF use at AOCs 32 and 43A (the Devens Recycling Center is located downgradient of AOC 32), coupled with the limited PFAS data set in groundwater, insufficient data are available to determine where soil sampling may be warranted. If groundwater data collected during this RI indicate that a PFAS soil source area is present, up to five soil borings will be advanced at the potential source area(s) to determine if PFAS contamination is present in soils. The location of the soil borings will be reviewed with USEPA and MassDEP and will be determined based on a review of the PFAS groundwater data. Soil samples will be collected for PFAS analysis from 0-0.5, 0.5-3, 3-7, 7-15 ft below ground surface (bgs), and 2 ft above the water table. If the water table is encountered at a depth less than 17 ft bgs then the final soil sampling interval at the boring will be shortened by the appropriate amount to collect a separate 2-foot sample just above the water table to assess leaching threat to groundwater. Soil borings will be conducted using DPT and the samples would be analyzed for PFAS by isotopic dilution analyte list in QAPP worksheet #15 (Appendix A). The sampling nomenclature, anticipated depths, and analytical scope are summarized in Table 7.

If PFAS contamination is confirmed in soils, additional soil sampling may be needed to determine the nature and extent of PFAS contamination in soil, to support a human health and ecological risk

assessment, and to collect data for the assessment of the source as a continuing source of PFAS to groundwater.

#### **5.2.3.4 Surface Water and Sediment Sampling**

A surface water and shallow sediment sample (0 to 6 inches), will be collected from the southern edge of the detention pond located north of the Devens recycling center facility (Figure 5). This location was selected to determine if PFAS are present in surface water and/or sediment associated with this detention pond. The selected location represents the area most likely to be impacted by historic releases of AFFF to this detention pond, which is located downgradient of AOC 32 and potentially received AFFF or AFFF-impacted water via overland flow during the Devens Fire Department response to the 2015 recycling facility fire. If a potential for human health and/or ecological risks are identified (i.e., PFAS are present at concentrations greater than USEPA SSLs [USEPA, 2018] or ecological screening values presented in the HERA Work Plan [KGS, 2018d]), additional surface water and sediment sampling may be needed to characterize the extent of PFAS in surface water and/or sediment at the detention pond. The sampling nomenclature for each surface water and sediment location and the quality control samples are provided in Table 3.

Surface water and sediment samples will be analyzed for PFAS by isotope dilution (analyte list in QAPP Worksheet #15), TOC, and grain size. Sample collection procedures are provided in Worksheet #21. Field QC samples will be collected at a frequency specified by Worksheet #20 of the UFP-QAPP (Appendix A).

#### **5.2.3.5 Monitoring Well Installation**

An overburden and bedrock monitoring well network for PFAS will be developed for AOCs 32/43A. The PFAS groundwater monitoring network at AOCs 32/43A will entail the use of existing monitoring wells that will be augmented with installation of new monitoring wells. For planning purposes up to two new overburden and one new bedrock monitoring wells will be installed at AOC 32 and up to two new overburden wells will be installed at AOC 43. The rationale for installing new monitoring wells at AOC 32/43A is provided in Table 8. Tentative locations for the new monitoring wells are shown on Figure 5. However, monitoring well installation will be completed following a review of the PFAS data obtained from groundwater vertical profiling, soil sampling, and existing monitoring wells; the final location and screen settings of the permanent monitoring wells will be reviewed with the USEPA and MassDEP and will be based on that data. The monitoring well network will be designed to monitor PFAS contamination in groundwater at AOCs 32/43A as well as provide bounding locations to demonstrate the limits of PFAS contamination in groundwater.

During advancement of the monitoring well borings, soil cores may be collected from the water table to the bottom of the boring for field lithologic classification at select locations and a subset of select samples will be collected for grain size, TOC, and total oxidizable precursor (TOP) assay analysis (Table 9). Confirmation of the depth to the top of bedrock may also be conducted, where it is an identified data gap after review of the vertical profiling data and previous bedrock elevation data from other investigations.

During installation of the bedrock monitoring well, bedrock will be continuously cored 20 ft into rock to evaluate the competency of the rock and weathering/fractures present. The well will be installed through drive and wash drilling. Rock cores will be described to evaluate fracturing and establish rock quality designations. Core will be archived at Devens. If little or no evidence of

fracturing is observed, it may be determined unnecessary to install a bedrock monitoring well. Whether the bedrock hole is left open or a well screen is installed will be determined before the well is drilled. If installed, the well will be cased into rock and hydraulic testing of the well may be conducted to document hydraulic characteristics. After the new wells are installed, an Area 2 synoptic water level survey will be conducted.

#### **5.2.3.6 Baseline Sampling of New Monitoring Wells**

New monitoring wells will be sampled after installation. The samples will be analyzed for PFAS by isotope dilution (analyte list in QAPP Worksheet #15). Samples from selected wells (approximately two per AOC) located within areas of high PFAS concentrations will be analyzed for PFAS via the TOP assay and for DOC. The new monitoring wells to be sampled along with the sampling nomenclature and analytical scope are provided in Table 10.

As discussed in Section 4.7, after new monitoring wells are installed, a synoptic water level measurement event will be conducted for Area 2 to evaluate groundwater flow within and between each AOC. The synoptic water level event will consist of monitoring water levels at a combination of new and existing monitoring wells. The specific wells for the synoptic water level event will be determined after the locations and screen settings of the new monitoring wells are determined.

### **5.3 AOC 43G**

#### **5.3.1 Introduction/Conceptual Site Model Discussion**

AOC 43G consists of the former Army Air Force Exchange Service (AAFES) gas station (Areas 2 and 3) and historical Gas Station G (Area 1) and has been the subject of previous site investigations and remedial investigations due to petroleum contamination in soil and groundwater resulting from the past operations. Historical Gas Station G was used by the Army primarily during World War II through the 1950's, prior to the development of AFFF. Therefore, Area 1 at AOC 43G is not considered to be a potential source for PFAS. The AAFES gas station was reportedly in use through 1993 with the associated underground tanks removed in 1996. The Army and USEPA signed a ROD in 1996 documenting the selection of intrinsic remediation with LTM as the selected remedy for AAFES. The major components of the selected remedy included intrinsic bioremediation, intrinsic bioremediation assessment data collection and groundwater modeling, installing additional monitoring wells, long-term groundwater monitoring, annual data reports to USEPA and MassDEP, and five-year reviews. Intrinsic bioremediation is the principal component proposed to prevent petroleum-related contaminants of concern (COCs) that exceed groundwater cleanup levels from potentially migrating off Army property (ABB, 1996a, Sovereign/HGL, 2015).

This AOC was not identified as a potential site for use and/or storage of AFFF during the base-wide PFAS PA (KGS, 2017). However, groundwater samples were collected from two monitoring wells at AOC 43G as part of the LTM sampling (KGS, 2018b) to provide more information about the overall extent of PFAS in groundwater at Devens. The monitoring wells selected for PFAS sampling are shown on Figure 6 and are located downgradient of both the AOC 43G source area and Devens Department of Public Works (DPW) buildings.

The interpretive water-table elevations for the 2017 LTM gauging event completed at AOC 43G are shown on Figure 6. Groundwater flow at AOC 43G is generally to the east/southeast direction, which is consistent with the site's surficial topography and historic flow directions (KGS, 2018c).

### **5.3.2 Previous PFAS Sampling**

Two overburden monitoring wells located downgradient of the AOC 43G source area were sampled for PFAS as part of the LTM sampling (KGS, 2018b). The locations of wells sampled, and associated results are presented on Figure 6. PFAS exceeded the USEPA LHA at both wells. No soil, surface water, or sediment samples were collected at AOC 43G for PFAS analysis. The data from previous sampling events are shown on Figure 6.

### **5.3.3 Remedial Investigation Approach/Sampling Plan**

The remedial investigation for PFAS at AOC 43G will entail sampling existing monitoring wells located upgradient of the PFAS contamination to assess the nature and extent of PFAS. The existing monitoring network will be augmented with groundwater vertical profiling at borings to delineate the vertical and lateral extent of PFAS in groundwater upgradient, downgradient, and crossgradient of PFAS detections. Surface water and sediment samples will be collected from the unnamed tributary to Robbins Pond, which is located approximately 450 feet downgradient of PFAS groundwater contamination reported at monitoring well AAFES-7. Details on the sampling plan for AOC 43G are provided below.

#### **5.3.3.1 Groundwater Sample Collection**

A network of existing monitoring wells has been selected at locations that are located upgradient of PFAS groundwater contamination to define the extent of PFAS in groundwater. The locations of monitoring wells to be sampled are shown on Figure 6. A listing of monitoring wells to be sampled at AOC 43G along with the sampling nomenclature and analytical scope are summarized in Table 2 and well construction information is provided in Table 4.

Groundwater samples will be collected from existing monitoring wells for PFAS analysis using technical procedures specified in Section 6.0 of this FSP and Worksheet #21 of the UFP QAPP. Field quality control samples, such as field duplicate and field blanks will be collected at a frequency as specified in Worksheet #20 of the UFP-QAPP (Appendix A). Groundwater samples will be analyzed for PFAS by isotope dilution (analyte list in QAPP Worksheet #15).

#### **5.3.3.2 Groundwater Vertical Profiling**

Monitoring well data collection will be followed by groundwater vertical profiling at new locations. Eight vertical profiles are planned at AOC 43G. Groundwater vertical profiling locations were selected to enhance the evaluation of PFAS nature and extent in areas upgradient, crossgradient and downgradient of PFAS groundwater contamination.

Figure 6 shows proposed vertical profile locations for AOC 43G. The rationale for each groundwater vertical profile boring is provided in Table 5. Groundwater vertical profile samples will be collected in 10-ft intervals from water table to rig refusal or the bedrock surface. The depth to water at AOC 43G will be measured at nearby monitoring wells (in accordance with Field Procedure SOP-F0002 [Worksheet # 21 of the UFP-QAPP], Appendix A) and depth to bedrock will be estimated based on the results of previous remedial investigations completed at AOC 43G (ABB, 1996a). If rig refusal is encountered significantly shallower than the anticipated depth to bedrock, one 10-ft step out boring will be conducted. The sampling nomenclature, anticipated depths, and analytical scope are summarized in Table 6.

Groundwater samples will be collected during advancement of the vertical profiling borings using field procedure SOP-F014 (Direct Push Technology) and SOP-F003 (Groundwater Sampling) and

SOP-F009 (PFAS Sampling) as listed in Section 6.0 of this FSP and Worksheet #21 of the UFP QAPP. Field quality control samples, such as field duplicate and field blanks will be collected at a frequency as specified in Worksheet #20 of the UFP-QAPP (Appendix A).

#### **5.3.3.3 Soil Sampling**

No potential soil source areas have been identified at AOC 43G. The existing PFAS data set for AOC 43G is limited to a one-time sampling of groundwater from two monitoring wells located downgradient of the AOC 43G source area. Therefore, an insufficient data set is currently available to determine where soil sampling may be warranted. If groundwater data collected from monitoring wells and groundwater vertical profile borings during this RI indicate that a PFAS source area is present, up to five soil borings will be advanced at the potential source area(s) to determine if PFAS contamination is present in soils. The location of the soil borings will be reviewed with USEPA and MassDEP and will be based on a review of the PFAS groundwater data. Soil samples will be collected from 0-0.5, 0.5-3, 3-7, 7-15 ft bgs, and 2 ft above the water table. If the water table is encountered at a depth less than 17 ft bgs then the final soil sampling interval at the boring will be shortened by the appropriate amount to collect a separate 2-foot sample just above the water table to assess leaching threat to groundwater. Soil borings will be conducted using DPT and the samples would be analyzed for PFAS by isotopic dilution analyte list in QAPP worksheet #15 (Appendix A). The sampling nomenclature, anticipated depths, and analytical scope are summarized in Table 7.

If PFAS contamination is confirmed in soils at, additional soil sampling may be needed to determine nature and extent of PFAS contamination in soil, to support a human health and ecological risk assessment, and to collect data for the assessment of the source as a continuing source of PFAS to groundwater.

#### **5.3.3.4 Surface Water and Sediment Sampling**

Collocated surface water and shallow sediment samples, involving cores (0 to 6 inches), will be collected from three locations in the unnamed tributary to Robbins Pond (Figure 6) and three locations within Robbins Pond to determine if PFAS are present in surface water and sediment at these surface water features (Figure 11). If a potential for human health and/or ecological risks are identified (i.e., PFAS are present at concentrations greater than USEPA SSLs (USEPA, 2018) or ecological screening values presented in the HERA Work Plan [KGS, 2018d]), additional surface water and sediment sampling may be needed to identify which areas of the unnamed tributary or Robbins Pond are contributing the greatest risk.

Surface water and sediment samples will be analyzed for PFAS by isotope dilution (analyte list in QAPP Worksheet #15), TOC, and grain size. Field QC samples will be collected at a frequency specified by Worksheet #20 of the UFP-QAPP (Appendix A). Sample collection procedures are provided in Worksheet #21. The sampling nomenclature for each surface water and sediment location and the quality control samples are provided in Table 3. In addition, Table 3 provides direction on whether surface water and sediments should be collected from the shoreline or main channel of a surface water system.

#### **5.3.3.5 Monitoring Well Installation**

A monitoring well network for PFAS will be developed based on a review of the monitoring well sampling, groundwater vertical profiling and, if completed, soil sampling PFAS results. For planning purposes up to two new overburden monitoring wells may be installed at AOC 43G. The

rationale for installing new monitoring wells at AOC 43G is provided in Table 8. Tentative locations for the new monitoring wells are shown on Figure 6. However, monitoring well installation will be completed following a review of the PFAS data obtained from groundwater vertical profiling, soil sampling, and existing monitoring wells; the final location and screen settings of the permanent monitoring wells will be reviewed with the USEPA and MassDEP and will be based on that data. During advancement of the monitoring well borings, soil cores may be collected from the water table to the bottom of the boring for field lithologic classification from select locations and select samples will be collected for grain size, TOC, and TOP assay analysis (Table 9). Confirmation of the depth to the top of bedrock may also be conducted, where it is an identified data gap after review of the vertical profiling data and previous bedrock elevation data from other investigations. After the new wells are installed, an Area 2 synoptic water level survey will be conducted.

#### **5.3.3.6 Baseline Sampling of New Monitoring Wells**

New monitoring wells will be sampled after installation. The samples will be analyzed for PFAS by isotope dilution (analyte list in QAPP Worksheet #15). Samples from selected wells (approximately two per AOC) located within areas of high PFAS concentrations will be analyzed for PFAS via the TOP assay and for DOC. The new monitoring wells to be sampled along with the sampling nomenclature and analytical scope are provided in Table 10.

As discussed in Section 4.7, after new monitoring wells are installed, a synoptic water level measurement event will be conducted for Area 2 to evaluate groundwater flow within and between each AOC. The synoptic water level event will consist of monitoring water levels at a combination of new and existing monitoring wells. The specific wells for the synoptic water level event will be determined after the locations and screen settings of the new monitoring wells are determined.

### **5.4 AOC 43J**

#### **5.4.1 Introduction/Conceptual Site Model Discussion**

The Army historically used AOC 43J as a former gas station/motor pool, and subsequently as a vehicle storage yard and maintenance facility for Fort Devens up to the time of base closure in 1996. Several USTs for gasoline, waste oil and diesel were formerly located at AOC 43J as shown on Figure 7. In addition, a 1,000-gallon UST for storage of maintenance wastes was reportedly located to the south of former building T2446 (Haley and Aldrich, 2017).

The Army and USEPA signed a ROD in 1996 documenting the selection of intrinsic remediation with LTM as the selected remedy for AAFES (ABB, 1996b). The major components of the selected remedy included intrinsic bioremediation (i.e., MNA), intrinsic bioremediation assessment data collection and groundwater modeling, installing additional monitoring wells, long-term groundwater monitoring, annual data reports to USEPA and MassDEP, and five-year reviews. It was noted during a five-year review that MNA would not reach the ROD goals within the required 30-year performance period. Therefore, pilot testing in 2010 and 2011 (Haley and Aldrich, 2015) and subsequent injections performed in 2012 of sodium persulfate/calcium peroxide were conducted to provide short-term oxidation and long-term reduction processes to augment MNA to reduce petroleum-related contaminant concentrations remaining at the site (Haley and Aldrich, 2015 and 2017).

The depth to bedrock at AOC 43J ranges from near surface at the northwestern edge of AOC 43J (near monitoring well XJM-93-01X) to approximately 20 ft bgs in the vicinity of the AOC 43J source area, to approximately 60 ft bgs to the southeast, near XJM-94-07X (ABB, 1996b).

Generalized groundwater flow direction in the overburden near AOC 43J are shown on Figure 7 and are based on historic depth to water measurements collected during LTM activities at this AOC (Haley & Aldrich, 2017). Groundwater flow at AOC 43J is generally to the east/southeast direction, which is consistent with the site's surficial and bedrock topography and historic flow directions (ABB 1996b).

AOC 43J was not identified as a potential site for use and/or storage of AFFF during the base-wide PFAS PA (KGS, 2017). However, groundwater samples were collected from four monitoring wells at AOC 43J as part of the LTM sampling (KGS, 2018b). The monitoring wells selected for PFAS sampling are shown on Figure 7 and are located downgradient of the AOC 43J source area.

#### **5.4.2 Previous PFAS Sampling**

PFOS and PFOA were not detected at three of the four monitoring wells sampled. A combined PFOS and PFOA concentration of 11.1 ng/L was reported at the most downgradient well sampled (XJM-94-07X). Based on this detection, AOC 43J was added to the Devens PFAS RI for further investigation. The data from previous sampling events are shown on Figure 7.

#### **5.4.3 Remedial Investigation Approach/Sampling Plan**

The remedial investigation for PFAS at AOC 43J will entail sampling existing monitoring wells located upgradient and crossgradient of the PFAS detections in groundwater to determine the nature and extent of PFAS in groundwater. There are no surface water bodies or wetland areas located in the immediate vicinity of AOC 43J. Therefore, surface water and sediment sampling at AOC 43J is not planned at this time. No new monitoring well installations are proposed for this AOC. Details on the sampling plan for AOC 43J are provided below.

##### **5.4.3.1 Groundwater Sample Collection**

Ten existing overburden monitoring wells will be sampled for PFAS analysis. These wells are located upgradient, within and downgradient of the AOC 43J source area and were selected to determine PFAS concentrations in groundwater. The locations of monitoring wells to be sampled are shown on Figure 7. A listing of monitoring wells to be sampled at AOC 43J along with the sampling nomenclature and analytical scope are summarized in Table 2 and well construction information is provided in Table 4.

Groundwater samples will be collected from existing monitoring wells for PFAS analysis using technical procedures specified in Section 6.0 of this FSP and Worksheet #21 of the UFP QAPP. Field quality control samples, such as field duplicate and field blanks will be collected at a frequency as specified in Worksheet #20 of the UFP-QAPP (Appendix A). Groundwater samples will be analyzed for PFAS by isotope dilution (analyte list in QAPP Worksheet #15).

##### **5.4.3.2 Groundwater Vertical Profiling**

Due to the relatively thin nature of the overburden at the AOC 43J source area (0 ft to 20 ft bgs) the existing monitoring wells are screened across much of the saturated zone of the overburden aquifer at AOC 43J (ABB, 1996b). Therefore, groundwater vertical profiling to delineate the vertical distribution of PFAS in the vicinity of the AOC 43J area wells (if present) is not anticipated. However, if the PFAS results obtained from the existing monitoring wells indicate



that data gaps regarding either the lateral or vertical distribution of PFAS in groundwater at AOC 43J exist, groundwater vertical profiling may be considered. The number and placement of the vertical profiles will be reviewed with the USEPA and MassDEP and will be based on the existing monitoring well data.

If advanced, groundwater vertical profile samples will be collected in 10-ft intervals from water table to rig refusal or the bedrock surface. The depth to water will be measured in accordance with Field Procedure SOP-F0002 (Worksheet # 21 of the UFP-QAPP, Appendix A) at nearby monitoring wells and depth to bedrock will be estimated based on the results of previous remedial investigations completed at AOCs 43J (ABB, 1996b). If rig refusal is encountered significantly shallower than the anticipated depth to bedrock, one 10-ft step out boring will be conducted.

Groundwater samples will be collected during advancement of the vertical profiling borings using field procedure SOP-F014 (Direct Push Technology) and SOP-F003 (Groundwater Sampling) and SOP-F009 (PFAS Sampling) as listed in Section 6.0 of this FSP and Worksheet #21 of the UFP QAPP. Field quality control samples, such as field duplicate and field blanks will be collected at a frequency as specified in Worksheet #20 of the UFP-QAPP (Appendix A).

#### **5.4.3.3 Soil Sampling**

No potential soil source areas have been identified at AOC 43J. The existing PFAS data set for AOC 43J is limited to a one-time sampling of three monitoring wells located downgradient of the AOC 43J source area during the LTM sampling (KGS, 2018b). Therefore, an insufficient data set is currently available to determine where soil sampling may be warranted. If groundwater data collected from monitoring wells and groundwater vertical profile borings, if completed, during this RI indicate that a PFAS source area is present, up to five soil borings will be advanced at the potential source area(s) to determine if PFAS contamination is present in soils. The location of the soil borings will be reviewed with USEPA and MassDEP and will be based on a review of the PFAS groundwater data. Soil samples will be collected from 0-0.5, 0.5-3, 3-7, 7-15 ft bgs, and 2 ft above the water table. Soil borings will be conducted using DPT and the samples would be analyzed for PFAS by isotopic dilution analyte list in QAPP worksheet #15 (Appendix A). The sampling nomenclature, anticipated depths, and analytical scope are summarized in Table 7.

If PFAS contamination is confirmed in soils, additional soil sampling may be needed to determine nature and extent of PFAS contamination in soil, to support a human health and ecological risk assessment, and to collect data for the assessment of the source as a continuing source of PFAS to groundwater.

### **5.5 AOC 76**

#### **5.5.1 Introduction/Conceptual Site Model Discussion**

The fire station at Jackson Road began operation in the 1940's by the Army for Fort Devens. Following the base closure in 1996, all Army fire and emergency response operations were transferred to MassDevelopment and the Devens Fire Department (KGS, 2018b). It has been reported that AFFF was applied to a dumpster fire at the fire station in the early 1990's. After 1996, this facility was transferred to MassDevelopment and fire-hose training with AFFF resulted in discharge of AFFF to pavement behind (east/southeast of) the building. AFFF likely flowed to edges of pavement to the east and south and also into the nearby storm water detention basin. AFFF was also reportedly stored in an area located immediately south of the fire department building (Figure 9).

Willow Brook is located east of AOC 76. Surficial topography slopes slightly downward to the northeast, toward Willow Brook. There are no existing monitoring wells in the vicinity of AOC 76; however, knowledge of the regional flow field indicates that groundwater flow direction at AOC 76 is likely to the northeast from the Devens Fire Station toward Willow Brook.

### **5.5.2 Previous PFAS Sampling**

Groundwater samples were collected at the water table and soil samples were collected from 0-5 ft bgs from nine temporary well points that were advanced during the SI addendum (BERS-Weston, 2018b). Maximum PFAS concentrations were reported in groundwater to the northeast of the parking lot and beneath the drainage retention pond at temporary well point FH-17-09 (Figure 9). Concentrations of PFAS that exceed the USEPA LHA were also detected in groundwater located to the southeast of parking area, near Willow Brook (former extent of pavement) and beneath the former storage area located immediately south of the Fire Station (Figure 9). PFAS were reported in composite soil samples collected from 0-5 ft bgs. Both PFOS and PFOA were detected in soil. The data from previous sampling events are shown on Figure 9.

### **5.5.3 Remedial Investigation Approach/Sampling Plan**

There are no existing groundwater monitoring wells at AOC 76. Therefore, the remedial investigation approach at AOC 76 entails advancement of groundwater vertical profiles to delineate the vertical and lateral extent of PFAS in groundwater, installation of piezometers to characterize groundwater flow direction, soil sampling near reported source areas, surface/sediment sampling at Willow Brook, and development of a monitoring well network through installation of monitoring wells. Details on the sampling plan for AOC 76 are provided below.

#### **5.5.3.1 Groundwater Vertical Profiling**

Groundwater vertical profiling will first be conducted to better delineate extent of PFAS in groundwater. The rationale for each vertical profile location is provided in Table 5. Groundwater vertical profile samples will be collected in 10-ft intervals from water table to rig refusal or the bedrock surface. Depth to water at AOC 76 is estimated to be approximately 12 ft bgs at the detention pond to 25 ft bgs near the Devens Fire Station (BERS-Weston, 2018b). Due to the absence of existing monitoring wells within AOC 76, during advancement of vertical profile borings for this RI, the water level will be measured at each vertical profile by advancing the stainless-steel sampling screen to the estimated water table depth, inserting a decontaminated electronic water level meter in to the inner rods and monitoring the water levels until it stabilizes. The screened interval for the first vertical profile sample will be adjusted to coincide with the water table. Groundwater samples will subsequently be collected at 10-ft intervals to refusal. The depth to bedrock is estimated to be approximately 50 ft bgs (MassGIS, 2018). If rig refusal is encountered significantly shallower than the anticipated depth to bedrock, one 10-ft step out boring will be conducted. The sampling nomenclature, anticipated depths, and analytical scope are summarized in Table 6.

Groundwater samples will be collected during advancement of the vertical profiling borings using field procedure SOP-F014 (Direct Push Technology) and SOP-F003 (Groundwater Sampling) and SOP-F009 (PFAS Sampling) as listed in Section 6.0 of this FSP and Worksheet #21 of the UFP QAPP. Field quality control samples, such as field duplicate and field blanks will be collected at a frequency as specified in Worksheet #20 of the UFP-QAPP (Appendix A).

At 12 of the vertical profiling locations, piezometers will be set at the water table. The piezometers will be surveyed, and a synoptic water level survey will be performed. The synoptic water level survey will be used to assist in placement of monitoring wells, and additional vertical profiling locations if they are needed. Locations tentatively identified for piezometer installation are noted on Table 5.

#### **5.5.3.2 Soil Sampling**

Soil sampling will be conducted at locations within and near suspected AFFF discharge/storage areas including the drainage detention pond, edge of pavement, former AFFF storage area behind the Devens Fire Station, and near the dumpster fire locations (Figure 9). The rationale for soil borings placement at AOC 76 is included in Table 5. The soil sampling locations were selected in consideration of historic AFFF use and storage at the site and the PFAS soil sampling results obtained during the SI addendum (BERS-Weston, 2018b). The soil sampling program at AOC 76 is designed to identify/confirm the location of soil source areas at AOC 76. PFAS contamination in groundwater at AOC 76 is attributed to releases of AFFF at the ground surface and PFAS migrated downward through the vadose zone (either as pure AFFF or in the dissolved-phase to the water table) where, due to their unique electrostatic properties, may have preferentially adsorbed to soil at the groundwater/air interface associated with the water table. Therefore, at each soil boring location composite soil samples will be collected from 0-1 ft bgs, 3-7 ft bgs, and another sample will be collected at the water table to identify the presence or absence of soil contamination in the overburden at each of the potential source areas associated with AOC 76. The sampling nomenclature, anticipated depths, and analytical scope for the soil borings at AOC 76 are summarized in Table 7. Once source areas are identified, additional soil sampling will be completed to further delineate PFAS in soil contamination and support a risk assessment.

#### **5.5.3.3. Surface Water and Sediment Sampling**

Surface water and shallow sediment samples, involving cores (0 to 6 inches), will be collected from six locations along Willow Brook between Robbins Shop Pond and the Nonacoicus Brook to determine if PFAS are present in surface water and sediment at Willow Brook. The locations are shown on Figure 11. WB-18-01 was selected to determine PFAS in surface water and sediment at the beginning of Willow Brook, prior to any potential inputs of PFAS from AOC 76. WB18-02 and 18-03 were located in areas most likely to be impacted by groundwater discharge of PFAS contaminated water originating from AOC 76. WB-18-04, WB-18-05, and WB-18-06 are located downstream of AOC 76.

If a potential for human health and/or ecological risks are identified (i.e., PFAS are present at concentrations greater than USEPA SSLs [USEPA, 2018] or ecological screening values presented in the HERA Work Plan [KGS, 2018d]), additional surface water and sediment sampling may be needed to identify which areas of Willow Brook is contributing the greatest potential risk.

Surface water and sediment samples will be analyzed for PFAS by isotope dilution (analyte list in QAPP Worksheet #15), TOC, and grain size. The sampling nomenclature for each surface water and sediment location and the quality control samples are provided in Table 3. Sample collection procedures are provided in Worksheet #21. Field QC samples will be collected at a frequency specified by Worksheet #20 of the UFP-QAPP (Appendix A).

#### **5.5.3.4 Monitoring Well Installation**

A monitoring well network for PFAS will be developed based on a review of the groundwater vertical profiling and soil sampling PFAS results, and the synoptic water level survey of the piezometers. For planning purposes up to ten new overburden monitoring wells (in addition to the 12 piezometers described in Section 5.5.3.1) may be installed at AOC 76. Tentative locations for the new monitoring wells are shown on Figure 9. However, monitoring well installation will be completed following a review of the PFAS data obtained from groundwater vertical profiling, soil sampling, and existing monitoring wells; the final location and screen settings of the permanent monitoring wells will be reviewed with the USEPA and MassDEP and will be based on that data. During advancement of the monitoring well borings, soil cores may be collected from the water table to the bottom of the boring for field lithologic classification from select locations and select samples will be collected for grain size, TOC, and TOP assay analysis (Table 9). Confirmation of the depth to the top of bedrock may also be conducted, where it is an identified data gap after review of the vertical profiling data. After the new wells are installed, an Area 2 synoptic water level survey will be conducted.

#### **5.5.3.5 Baseline Sampling of New Monitoring Wells**

New monitoring wells will be sampled after installation. The samples will be analyzed for PFAS by isotope dilution (analyte list in QAPP Worksheet #15). Samples from selected wells (approximately two per AOC) located within areas of high PFAS concentrations will be analyzed for PFAS via the TOP assay and for TOC. The new monitoring wells to be sampled along with the sampling nomenclature and analytical scope are provided in Table 10.

### **5.6 MACPHERSON WATER SUPPLY WELL**

#### **5.6.1 Introduction/Conceptual Site Model Discussion**

MacPherson well is located on an undeveloped parcel of land that is bound by the Nashua River to the west and north, by the Nonacoicus Brook to the east and West Main Street to the south. The town of Ayer municipal wastewater treatment facility and infiltration beds are located to the east of the MacPherson well, on the opposite side of the Nonacoicus Brook. Residential properties and a plastic manufacturing facility are located to the west of the MacPherson well, on the opposite side of the Nashua River. Various commercial properties and Fort Devens are located to the south of west Main Street.

#### **5.6.2 Previous PFAS Sampling**

MassDevelopment operates the MacPherson water supply well as part of the Devens municipal water supply. MassDevelopment first sampled the MacPherson well for PFAS in July 2016 and the sum of PFOS and PFOA was reported at 69 ng/L, just under the USEPA LHA of 70 ng/L. MassDevelopment continued to sample the well on a quarterly basis and the sum of PFOS and PFOA ranged between 62 ng/L and 107 ng/L. In February 2018, the MacPherson municipal well was taken out of service after MassDEP informed MassDevelopment that MassDEP is considering adopting a guideline, known as an Office of Research and Standards Guideline (ORSG), which provides recommended contaminant levels in drinking water and is set to be protective against adverse health effects for all people consuming the water for a lifetime. The ORSG is the level of the five PFAS compounds (PFOS, PFOA, perfluorononanoic acid [PFNA], perfluorohexane sulfonic acid [PFHxS], and perfluoroheptanoic acid [PFHpA]), individually or in combination of 70 ng/L.

### **5.6.3 Remedial Investigation Approach/Sampling Plan**

The remedial investigation for PFAS at MacPherson water supply well will entail sampling existing groundwater wells that are located upgradient of the MacPherson water supply well and groundwater vertical profiling. In addition, the effluent from the Town of Ayer waste water treatment plant, which discharges to the Nonacoicus Brook (Figure 10) will be sampled for PFAS. Details on the sampling plan for the MacPherson water supply well are provided below.

#### **5.6.3.1 Groundwater Sampling**

Existing monitoring wells at AOC 69W, which is located approximately 1,800 ft south and upgradient of the MacPherson water supply well (Figures 1 and 8) will be sampled for PFAS analysis. These wells are the closest available Devens monitoring wells located upgradient of the MacPherson water supply well and will provide data regarding the presence or absence of PFAS in groundwater upgradient (to the south) of the MacPherson water supply well. The locations of AOC 69W monitoring wells are shown on Figure 8. A listing of monitoring wells to be sampled at AOC 69W along with the sampling nomenclature and analytical scope are summarized in Table 2 and well construction information is provided in Table 4.

There are three observation wells (MPP-93-01 through MPP-93-03) near the MacPherson water supply well that are proposed to be sampled for PFAS analysis (Table 2). These wells are not maintained by the Army and are not routinely sampled. Therefore, the viability of these wells for sampling will be assessed as part of this RI. If the wells are determined to be viable and well construction information can be obtained, then these wells will be sampled for PFAS analysis.

Groundwater samples will be collected from existing monitoring wells for PFAS analysis using technical procedures specified in Section 6.0 of this FSP and Worksheet #21 of the UFP QAPP. Field quality control samples, such as field duplicate and field blanks will be collected at a frequency as specified in Worksheet #20 of the UFP-QAPP (Appendix A). Groundwater samples will be analyzed for PFAS by isotope dilution (analyte list in QAPP Worksheet #15).

#### **5.6.3.2 Groundwater Vertical Profiling**

Groundwater vertical profiling will be conducted along a perimeter transect that encircles the MacPherson water supply well to delineate the vertical and lateral extent of PFAS in groundwater in the immediate vicinity of the well. The locations of proposed vertical profiles are shown on Figure 10 and the rationale for each vertical profile is provided in Table 5. Groundwater vertical profile samples will be collected in 10-ft intervals from water table to rig refusal or the bedrock surface. The depth to water will be measured in accordance with Field Procedure SOP-F0002 (Worksheet #21 of the UFP-QAPP, Appendix A) at nearby monitoring wells. If rig refusal is encountered significantly shallower than the anticipated depth to bedrock, one 10-ft step out boring will be conducted.

Additional groundwater vertical profiling locations are anticipated to be advanced at Devens along subsequent transects located to the south and upgradient of the PFAS contamination identified at the MacPherson water supply well in an effort to trace PFAS groundwater contamination back to a known or unknown source at Devens (Figure 10). The depth intervals sampled at these additional vertical profile borings may target the zone of PFAS contamination observed at the initial transect and may/or may not extend to bedrock. The final location of additional groundwater vertical profile borings and the associated sampling intervals will be based on a review of the groundwater

vertical profile results obtained from the initial transect of vertical profiles, but for planning purposes are anticipated to be in the vicinity of the transect shown on Figure 10.

#### **5.6.3.3 Soil Sampling**

The presence of PFAS in groundwater near the MacPherson water supply well vertical profiling locations is assumed to be distal from potential PFAS sources. Therefore, PFAS near the MacPherson water supply well likely exists in the dissolved phase in this area of the aquifer and, as such, collection of soil samples is not planned at the eight initial groundwater vertical profiles or six subsequent vertical profiles. If groundwater data collected during this RI indicate that a PFAS soil source area is present, up to five soil borings will be advanced at the potential source area(s) to determine if PFAS contamination is present in soils. The location of the soil borings will be reviewed with USEPA and MassDEP and will be determined based on a review of the PFAS groundwater data. Soil samples will be collected from 0-0.5, 0.5-3, 3-7, 7-15 ft bgs, and 2 ft above the water table. If the water table is encountered at a depth less than 17 ft bgs then the final soil sampling interval at the boring will be shortened by the appropriate amount to collect a separate 2-foot sample just above the water table to assess leaching threat to groundwater. Soil borings will be conducted using DPT and the samples would be analyzed for PFAS by isotopic dilution analyte list in QAPP worksheet #15 (Appendix A). The sampling nomenclature, anticipated depths, and analytical scope are summarized in Table 7.

If PFAS contamination is confirmed in soils at, additional soil sampling may be needed to determine nature and extent of PFAS contamination in soil, to support a human health and ecological risk assessment, and to collect data for the assessment of the source as a continuing source of PFAS to groundwater.

#### **5.6.3.4 Surface Water and Sediment Sampling**

As described in Sections 5.1.3.2 and 5.5.3.3 surface water and sediment samples will be collected from Nonacoicus Brook (located approximately 750 feet northeast of the MacPherson water supply well) and Willow Brook (located approximately 900 feet east of the MacPherson water supply well) will be sampled.

It is unknown if PFAS at the MacPherson water supply well are related to surface water from the Nashua River. However, if PFAS are detected in groundwater at vertical profiles advanced between the MacPherson water supply well and the Nashua River, surface water and sediment sampling of the Nashua River near the MacPherson water supply well may be conducted. The number and location of surface water and sediment locations in the Nashua River will be determined on a review of the PFAS groundwater results.

#### **5.6.3.5 Other Sampling**

The effluent of the Town of Ayer Water Treatment plant will be sampled for PFAS analysis. The effluent from this plant discharges to the Nashua River downstream of the MacPherson water supply well (Figure 10).

#### **5.6.3.6 Monitoring Well Installation**

A PFAS groundwater monitoring well network will be developed based on a review of the groundwater vertical profiling and existing monitoring well PFAS results. For planning purposes, up to six monitoring wells will be advanced to support monitoring of PFAS at the MacPherson

water supply well. Tentative locations for the new monitoring wells are shown on Figure 10. However, monitoring well installation will be completed following a review of the PFAS data obtained from groundwater vertical profiling and existing monitoring wells; the final location and screen settings of the permanent monitoring wells will be reviewed with the USEPA and MassDEP and will be based on that data. During advancement of the monitoring well borings, soil cores may be collected from the water table to the bottom of the boring for field lithologic classification from select locations and select samples will be collected for grain size, TOC, and TOP assay analysis. Confirmation of the depth to the top of bedrock may also be conducted, where it is an identified data gap after review of the vertical profiling data and previous bedrock elevation data from other investigations. After the new wells are installed, an Area 2 synoptic water level survey will be conducted.

#### **5.6.3.7 Baseline Sampling of New Monitoring Wells**

New monitoring wells will be sampled after installation. The samples will be analyzed for PFAS by isotope dilution (analyte list in QAPP Worksheet #15). Samples from selected wells (approximately two per AOC) located within areas of high PFAS concentrations will be analyzed for PFAS via the TOP assay and for DOC. The new monitoring wells to be sampled along with the sampling nomenclature and analytical scope are provided in Table 10.

### **6.0 FIELD QUALITY CONTROL SAMPLES**

Collection of field quality control (QC) samples, including field duplicates, equipment blanks, field reagent blanks, matrix spikes, and matrix spike duplicates, associated with groundwater, soil, surface water, and sediment sampling efforts are required. A summary of the types and frequency of field quality control samples to be collected is provided in Worksheet #20 (Field Quality Control Sample Summary) of the UFP-QAPP (Appendix A).

### **7.0 FIELD PROCEDURES**

The field SOP associated with the project are listed in Worksheet #21 of the UFP-QAPP and the field equipment calibration, maintenance, testing and inspection requirements are listed in Worksheet #22 of the UFP-QAPP, which are both provided in Attachment A of the UFP-QAPP (Appendix A). The field SOPs are summarized below.

- Groundwater vertical profile borings will be conducted in accordance with the procedure specified in Worksheet #17 of the UFP-QAPP and SOP-F014 (Direct Push Technology).
- Soil samples will be collected in accordance with SOP-F015 (Soil Sampling – Surface and Shallow Depth) and SOP-F009 (PFAS Sampling).
- Surface water and sediment samples will be collected in accordance with SOP-F004 (Sediment-Surface Water Sampling) and SOP-F009 (PFAS Sampling).
- Groundwater samples will be collected in accordance with SOP-F003 (Groundwater Sampling) and SOP-F009 (PFAS Sampling).
- Water quality parameters: dissolved oxygen, oxidation reduction potential, specific conductance, temperature, and pH will be collected in accordance with SOP-F003 (Groundwater Sampling).

- Static depth to groundwater measurements will be measured in accordance with SOP-F002 (Evaluation of Existing Monitoring Wells and Water Level Measurements).
- New groundwater monitoring wells will be constructed and developed in accordance with SOP-F017 (Monitoring Well Construction and Development).
- Soil samples and soil cores will be described in the field in accordance with SOP-F018 (Soil Description).
- Private water supply wells will be purged and samples in accordance with SOP-F016 (Private and Water Supply Well Sampling).

## **8.0 SAMPLING PACKAGING AND SHIPPING REQUIREMENTS**

Sample volume, containers, preservation, and holding time requirements are provided in combined Worksheet #19 and #30 (Sample Containers, Preservation and Hold Times) of the UFP-QAPP (Appendix A). Procedures for field sample handling, packing and shipment are detailed in SOP-F008 (Sample Handling), which is listed in Worksheet #21 of the UFP-QAPP (Appendix A). Sampling handling, custody and disposal requirements are provided in Worksheet #26 and 27 of the UFP-QAPP and provided in Attachment A of the UFP-QAPP (Appendix A).

## **9.0 INVESTIGATION-DERIVED WASTE**

IDW management procedures are presented in Worksheet #17 of the UFP-QAPP and will be managed in accordance with SOP-F011 (IDW Management), which is listed in Worksheet #21 of the UFP-QAPP and provided in Attachment A of the UFP-QAPP (Appendix A).

## **10.0 FIELD ASSESSMENT PROCEDURES AND CORRECTIVE ACTIONS**

Periodic assessments will be performed during the course of the project so that the planned project activities are implemented in accordance with the UFP-QAPP. The type, frequency, and responsible parties of planned assessment activities to be performed for the project as well as any corrective action measures, are provided in Combined Worksheet #31, 32, and 33 (Assessment and Corrective Actions) of the UFP-QAPP (Appendix A).



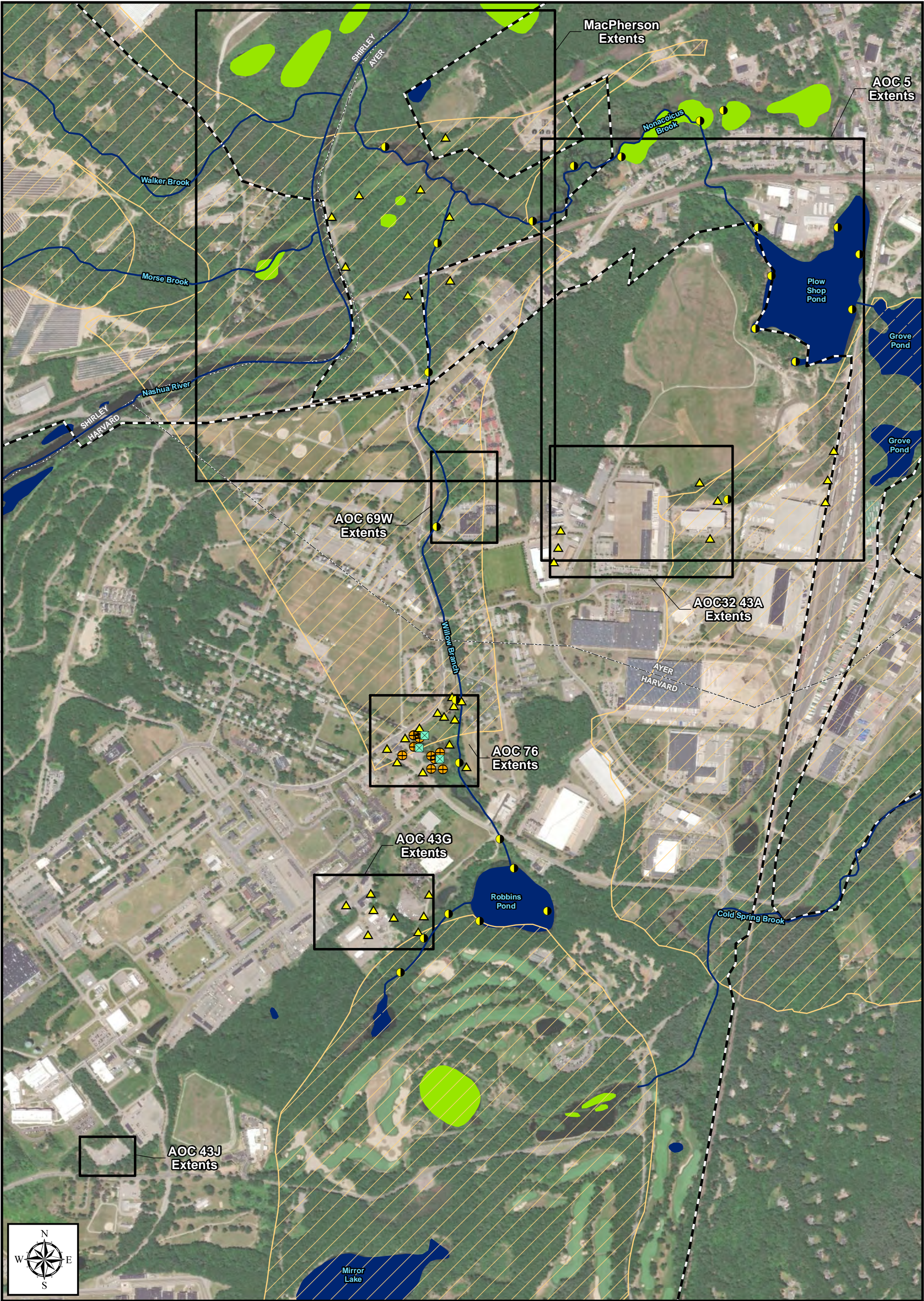
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- Legend**
- Proposed Surface Water and Sediment Sampling Location
  - Proposed Soil Boring and Vertical Profiling Location
  - Proposed Vertical Profiling Location
  - Proposed Soil Boring Location
  - City/Town Boundary
  - Stream/River
  - Lake/Pond
  - Swamp/Marsh
  - MassDEP Zone II Wellhead Protection Area
  - Former Fort Devens Boundary

Area 2 Figure Extents  
Devens PFAS RI WP - Area 2 FSP Addendum

Former Fort Devens Army Installation  
Devens, Massachusetts

**KOMAN Government Solutions, LLC**  
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

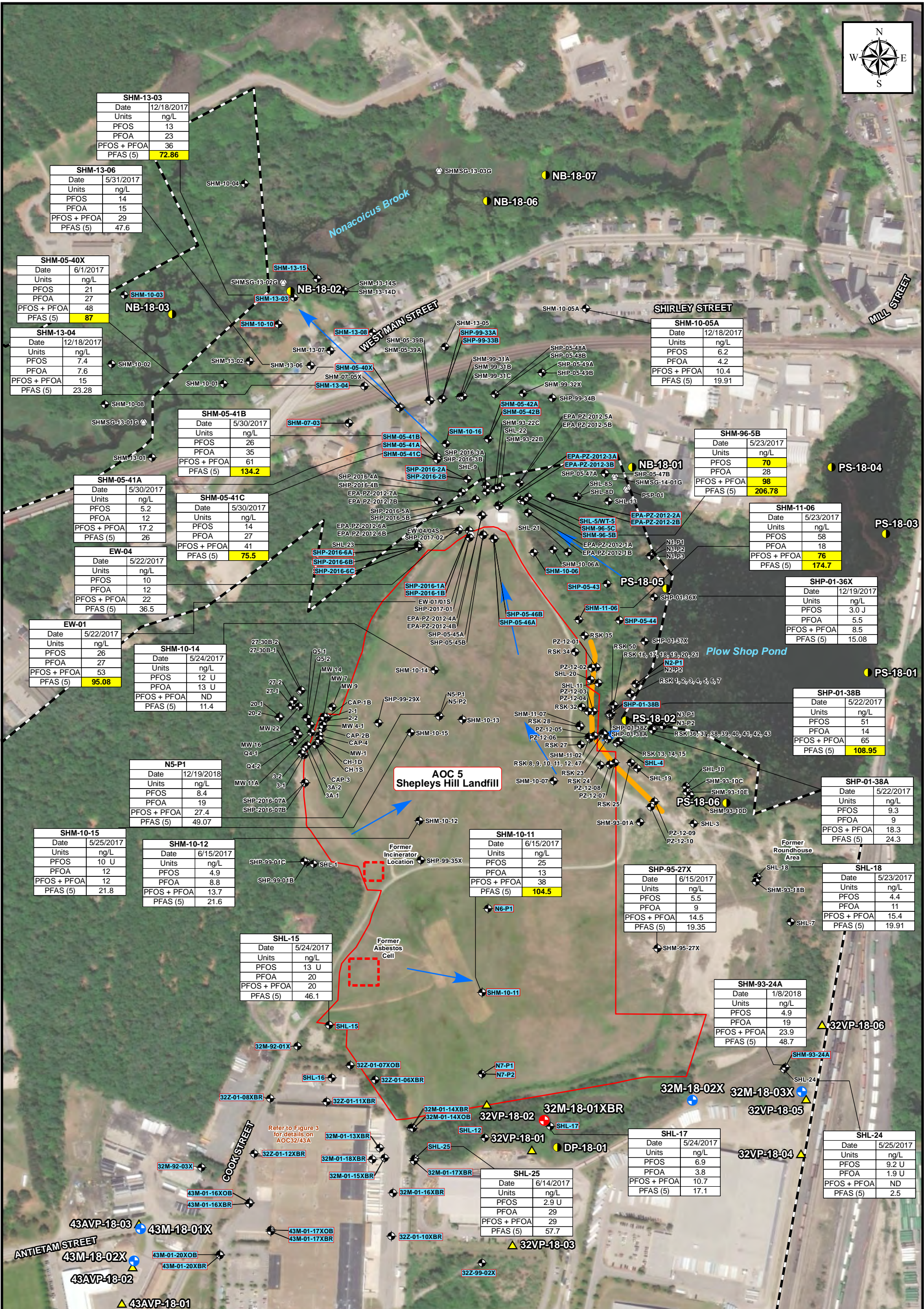
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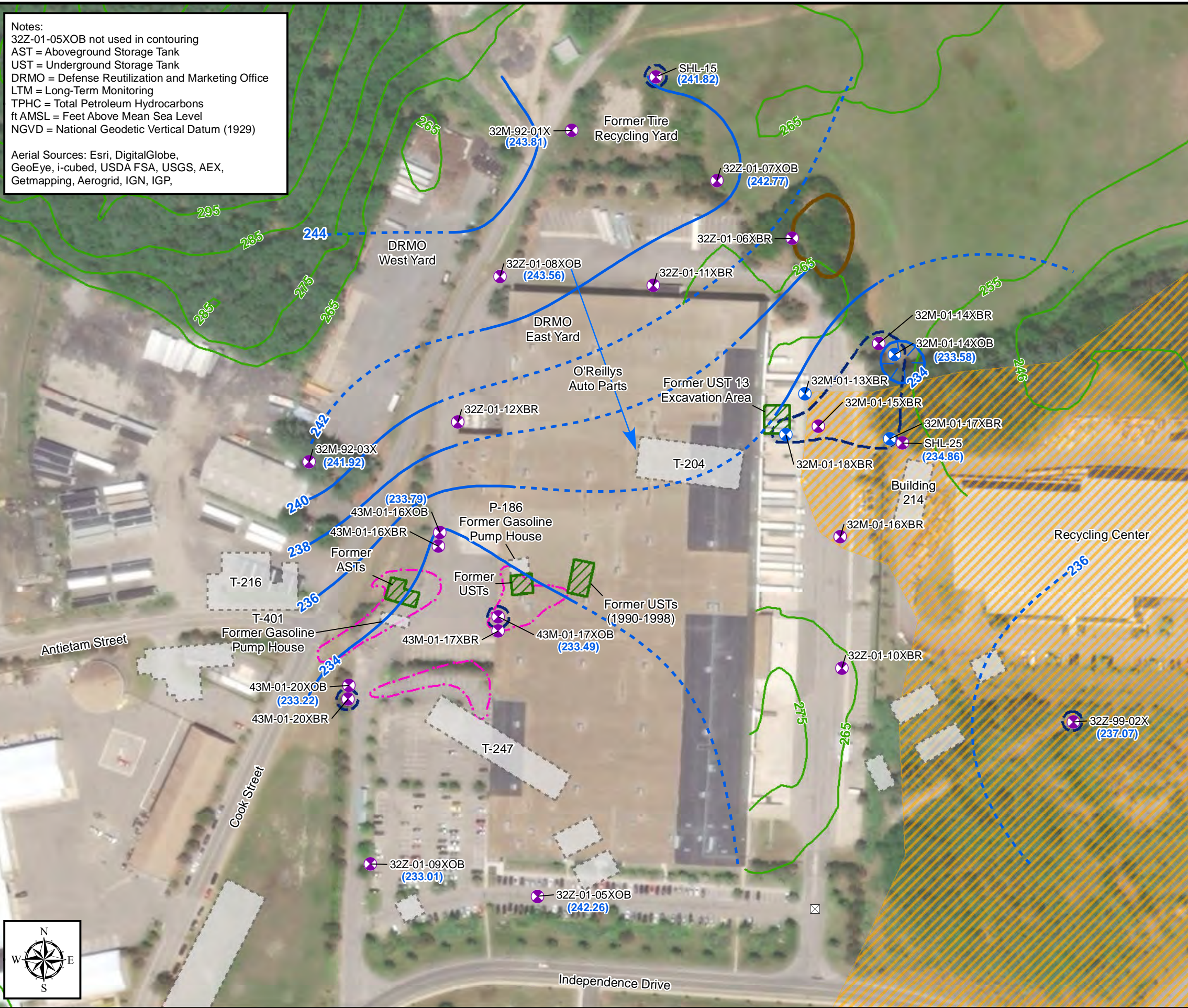






Notes:  
32Z-01-05XOB not used in contouring  
AST = Aboveground Storage Tank  
UST = Underground Storage Tank  
DRMO = Defense Reutilization and Marketing Office  
LTM = Long-Term Monitoring  
TPHC = Total Petroleum Hydrocarbons  
ft AMSL = Feet Above Mean Sea Level  
NGVD = National Geodetic Vertical Datum (1929)

Aerial Sources: Esri, DigitalGlobe,  
GeoEye, i-cubed, USDA FSA, USGS, AEX,  
Getmapping, Aerogrid, IGN, IGP,



**Legend**

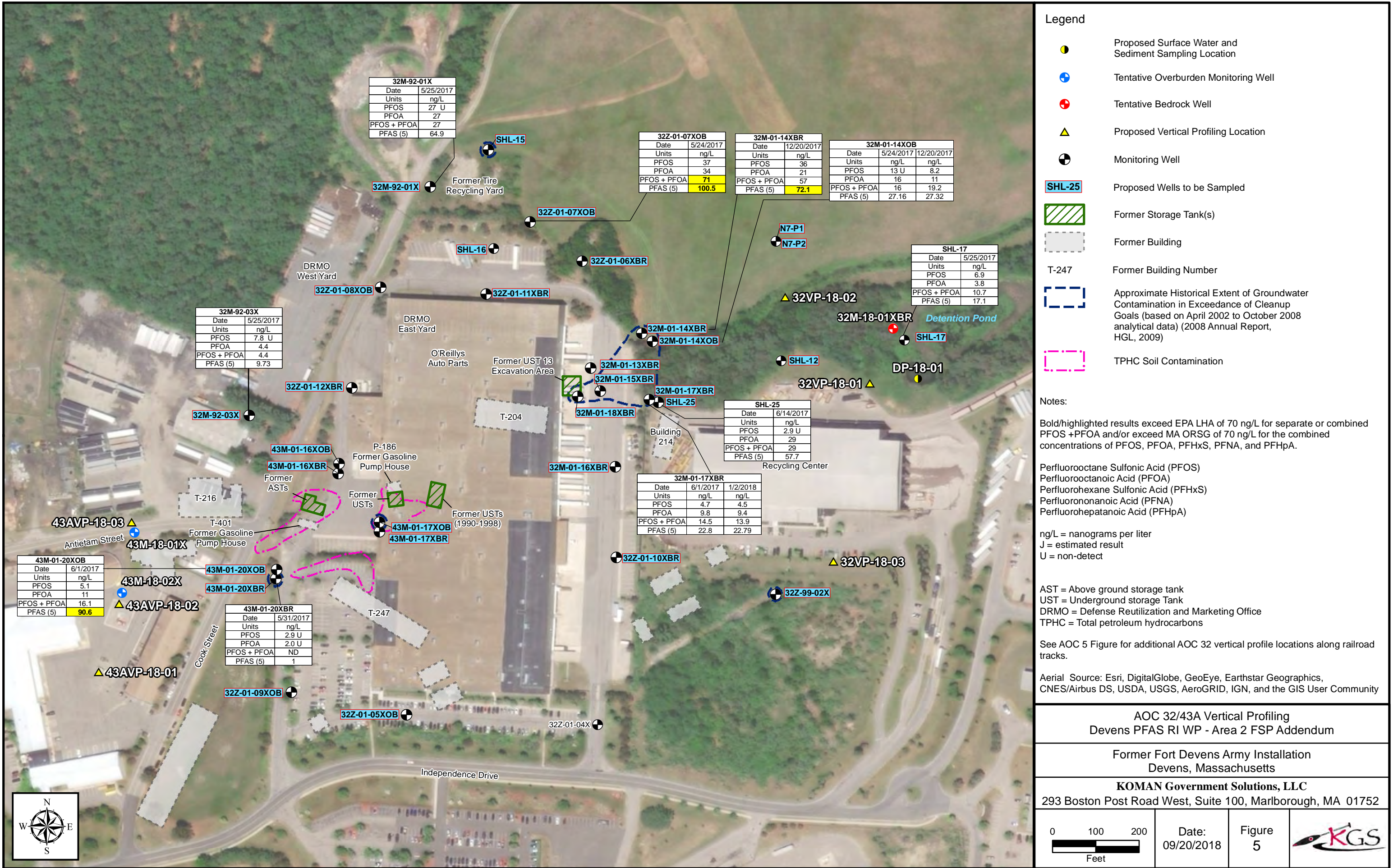
- LTM Sample Well
- LTM Well - Periodic Gauge Only
- Monitoring Well - Paved Over
- Groundwater Elevation (ft NGVD)
- Groundwater Contour (ft NGVD) (Interval = 2 ft)
- Inferred Groundwater Elevation Contour
- Groundwater Flow Direction
- Well Identification
- DEP Approved Wellhead Protection Areas (Zone II)
- Former Storage Tank(s)
- Former Building
- Former Building Number
- Approximate Historical Extent of Groundwater Contamination in Exceedance of Cleanup Goals (based on April 2002 to October 2008 analytical data) (2008 Annual Report, HGL, 2009)
- TPHC Soil Contamination
- Remaining Bedrock Outcrop
- Topographic Contour (Ft AMSL)

|  |                     |             |
|--|---------------------|-------------|
| AOCs 32/43A Interpretive Water Table Elevation<br>Overburden Wells, July 2017<br>Devens PFAS RI WP - Area 2 FSP Addendum |                     |             |
| Former Fort Devens Army Installation<br>Devens, Massachusetts  |                     |             |
| KOMAN Government Solutions, LLC<br>293 Boston Post Road West, Suite 100, Marlborough, MA 01752                           |                     |             |
|  | Date:<br>07/05/2018 | Figure<br>3 |
|  |                     |             |

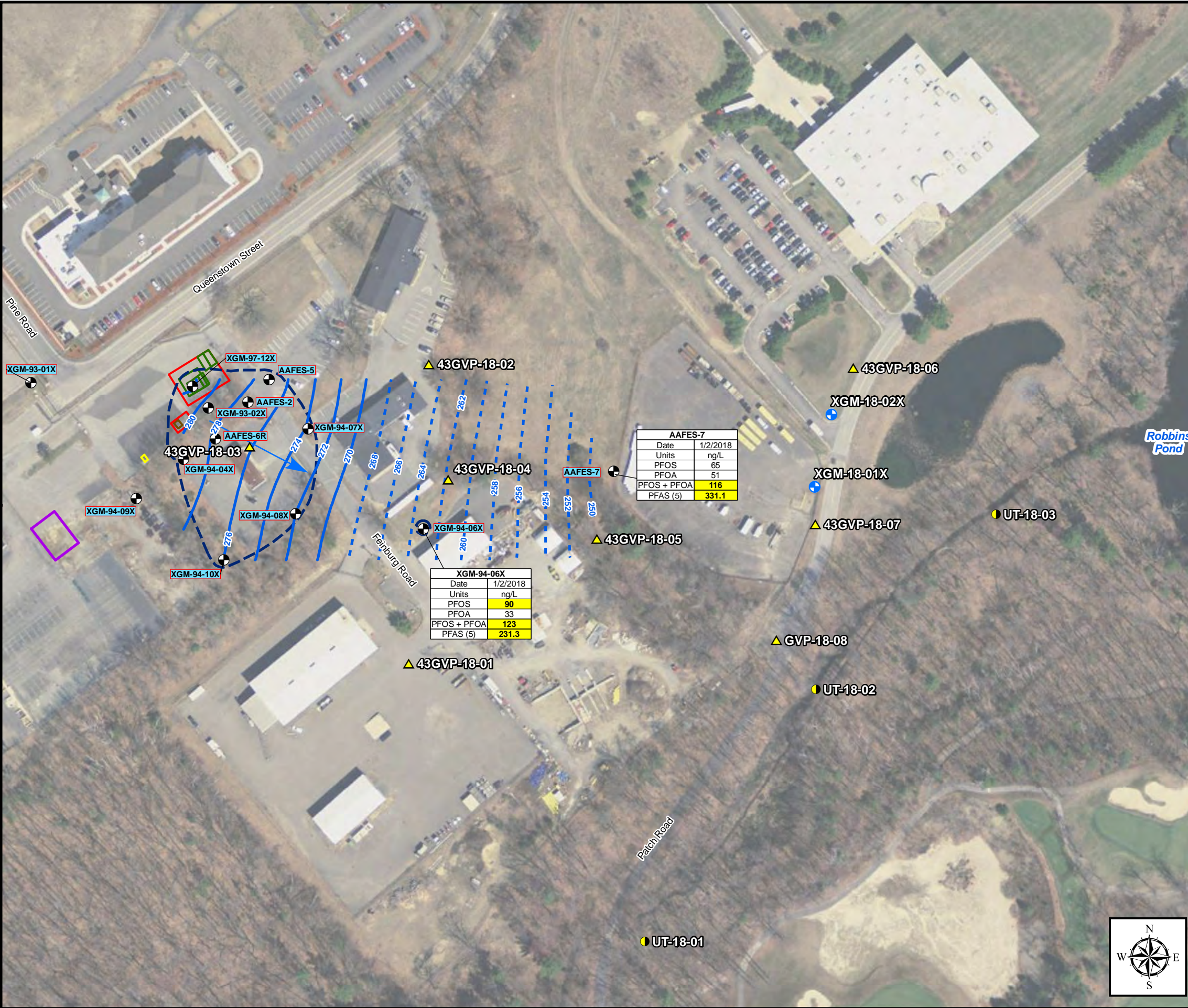












Legend

AAFES-2

Proposed Wells to be Sampled

Proposed Vertical Profiling Location

Proposed Surface Water and Sediment Sampling Location

Tentative Overburden Monitoring Well

Monitoring Well

Groundwater Flow Direction

Groundwater Elevation Contour (ft NGVD)  
(Contour Interval = 2 ft) October 2017

Inferred Groundwater Elevation Contour

Approximate Historical Extent of Groundwater Contamination in Exceedance of Cleanup Goals (based on 1999 to 2008 analytical data) (2008 Annual Report, HGL, 2009)

Area 1

Former Gasoline UST(s)

Former Waste Oil UST

Former Waste Oil AST

Former UST Area

Notes:

All concentrations in nanograms per liter (ng/L)  
Bold/highlighted results exceed EPA LHA of 70 ng/L for separate or combined PFOS +PFOA and/or exceed MA ORSG of 70 ng/L for the combined concentrations of PFOS, PFOA, PFHxS, PFNA, and PFHpA.

Perfluorooctane Sulfonic Acid (PFOS)  
Perfluorooctanoic Acid (PFOA)  
Perfluorohexane Sulfonic Acid (PFHxS)  
Perfluorononanoic Acid (PFNA)  
Perfluorheptanoic Acid (PFHpA)

ng/L = nanograms per liter  
J = estimated result  
U = non-detect  
AST = Above ground storage tank  
UST = Underground storage Tank

Aerial Sources: 2013, USGS, MassGIS

AOC 43G Vertical Profiling  
Devens PFAS RI WP - Area 2 FSP Addendum

Former Fort Devens Army Installation  
Devens, Massachusetts

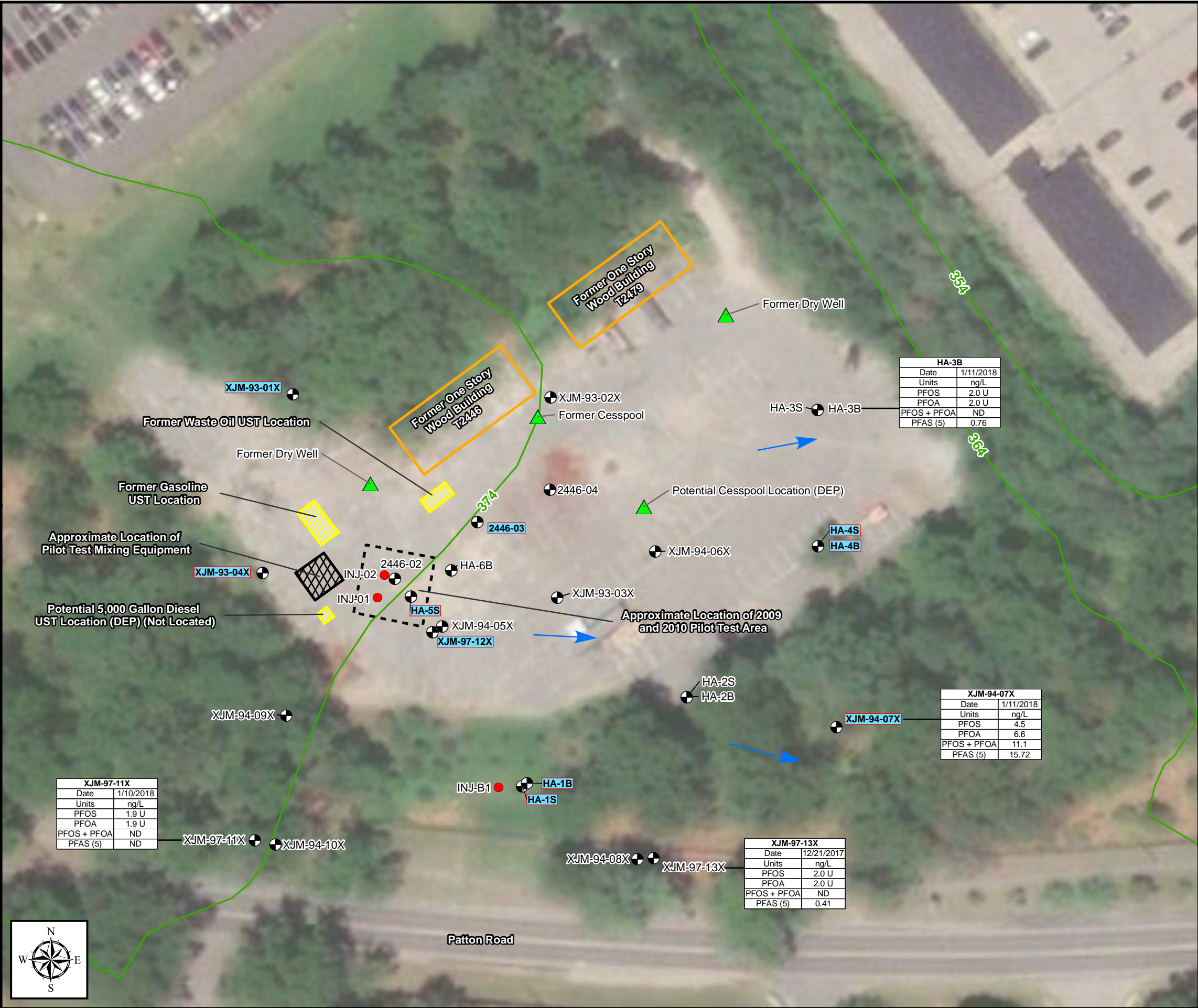
KOMAN Government Solutions, LLC  
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

075150  
Feet

Date:  
09/20/2018

Figure  
6





Legend

Approximate Location of Potential Former Source Area Investigated

Monitoring Well

Injection Well

Proposed Wells to be Sampled

Approximate Groundwater Flow Direction

Topographic Contour (ft AMSL)

Approximate Location of Former UST

Approximate Location of 2009 and 2010 Pilot Test Area

Approximate Location of Pilot Test Mixing Equipment

Former Building

Notes:

All concentrations in nanograms per liter (ng/L)  
Bold/highlighted results exceed EPA LHA of 70 ng/L for separate or combined PFOS + PFOA and/or exceed MA ORSG of 70 ng/L for the combined concentrations of PFOS, PFOA, PFHxS, PFNA, and PFHpA.

Perfluorooctane Sulfonic Acid (PFOS)  
Perfluorooctanoic Acid (PFOA)  
Perfluorohexane Sulfonic Acid (PFHxS)  
Perfluorononanoic Acid (PFNA)  
Perfluorhepatanoic Acid (PFHpA)

ng/L = nanograms per liter  
J = estimated result  
U = non-detect

References:  
HGL. LTMMMP 2010, Haley Aldrich Inc. 2015

Aerial Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

AOC 43J Vertical Profiling Locations  
Devens PFAS RI WP - Area 2 FSP Addendum

Former Fort Devens Army Installation  
Devens, Massachusetts

KOMAN Government Solutions, LLC  
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

03060

Feet

Date:

08/31/2018

Figure

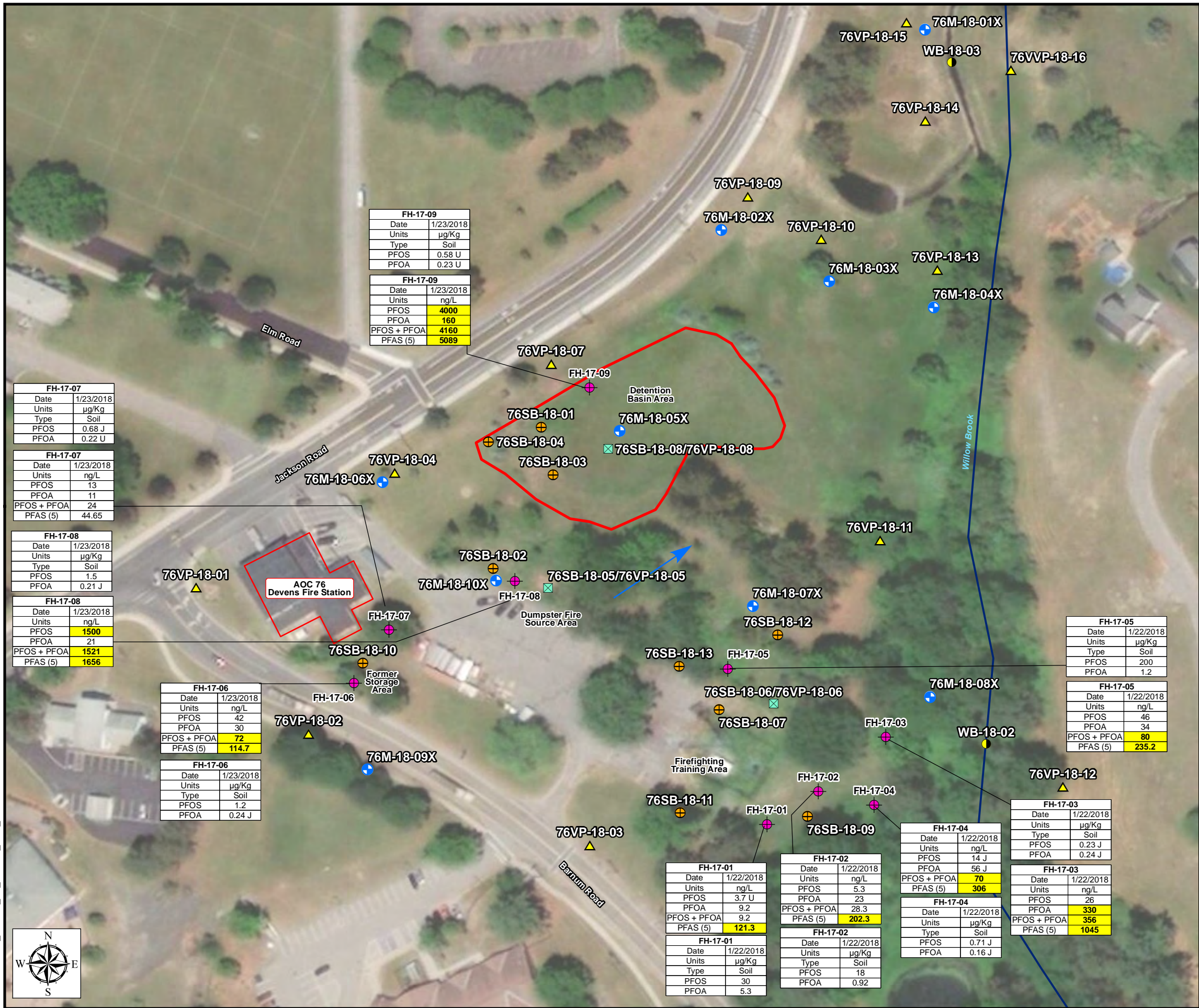
7







File: PFAS2018\_A2FSP\_F9\_AOC76\_VPL\_SB.mxd



Legend

- Tentative Overburden Monitoring Well
- Proposed Surface Water and Sediment Sampling Location
- Proposed Soil Boring and Vertical Profiling Location
- Proposed Vertical Profiling Location
- Proposed Soil Boring Location
- Temporary Well Location from SI
- Approximate Groundwater Flow Direction
- Detention Basin Area
- Area of Contamination (AOC)

Notes:

ng/L = nanograms per Liter  
µg/Kg = micrograms per Kilogram

Bold/highlighted results exceed EPA LHA of 70 ng/L for separate or combined PFOS +PFOA and/or exceed MA ORSG of 70 ng/L for the combined concentrations of PFOS, PFOA, PFHxS, PFNA, and PFHpA.

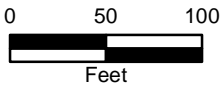
Perfluorooctane Sulfonic Acid (PFOS)  
Perfluorooctanoic Acid (PFOA)  
Perfluorohexane Sulfonic Acid (PFHxS)  
Perfluorononanoic Acid (PFNA)  
Perfluorheptanoic Acid (PFHpA)

J = estimated result  
U = non-detect

AOC 76 Vertical Profiling and Soil Boring Locations  
Devens PFAS RI WP - Area 2 FSP Addendum

Former Fort Devens Army Installation  
Devens, Massachusetts

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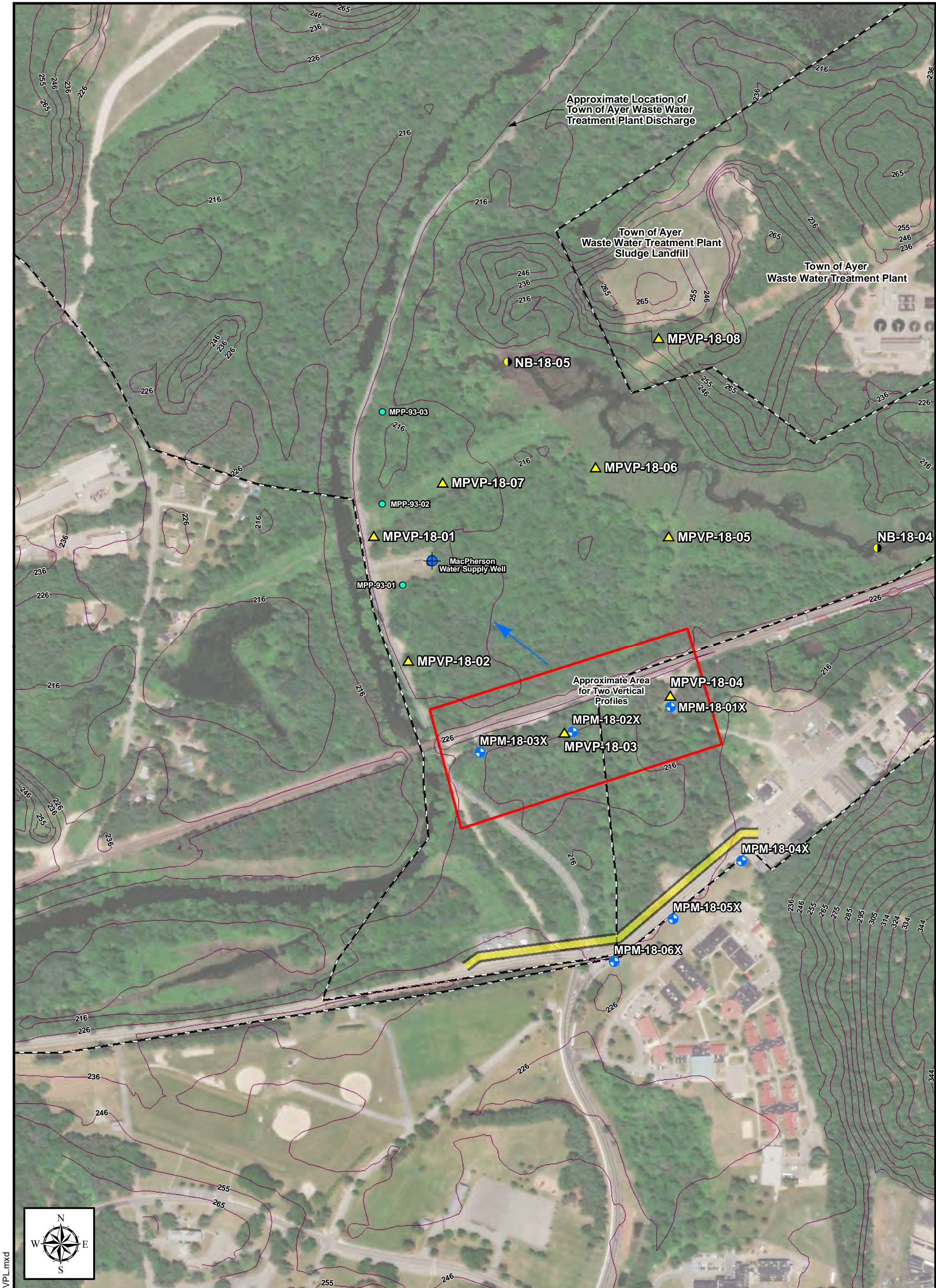


Date:  
07/18/2018

Figure  
9







Tentative Overburden Monitoring Well

Proposed Vertical Profiling Location

Proposed Surface Water and Sediment Sampling Location

MacPherson Water Supply Well

Public/Sentry Well

Potential Future Vertical Profiling Transect

Approximate Groundwater Flow Direction

Topographic Contour (feet above sea level)

Former Fort Devens Boundary

Note:  
Topographic Contour Source: MassGIS, Elevation Contours (1:5,000) - North American Vertical Datum of 1988.  
  
MacPherson Well falls within the MassDEP Zone II Wellhead Protection Area

MacPherson Water Supply Well Vertical Profiling Locations  
Devens PFAS RI WP - Area 2 FSP Addendum

Former Fort Devens Army Installation  
Devens, Massachusetts

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0200400

Feet

Date:

08/31/2018

Figure

10

File: PFAS2018\_A2FSP\_F10\_MacPherson\_VPL.mxd

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community





- Legend
- Proposed Surface Water and Sediment Sampling Location
  - City/Town Boundary
  - Stream/River
  - Lake/Pond
  - Swamp/Marsh
  - Former Fort Devens Boundary

Willow Brook and Vicinity Surface Water and Sediment Locations  
Devens PFAS RI WP - Area 2 FSP Addendum

Former Fort Devens Army Installation  
Devens, Massachusetts

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0 400 800  
Feet

Date:  
09/20/2018

Figure  
11







**Table 1**  
**Area 2 Existing Monitoring Well Construction Information – AOC 5**  
**Area 2 Field Sampling Plan**  
**Devens PFAS Remedial Investigation Workplan**

| Well Identifier            | Screen Interval<br>(ft bgs) | Screen Elevation<br>(ft NAVD88) | Ground Surface<br>(ft NAVD88) | TOC Elevation<br>(ft NAVD88) | Formation Type at<br>Screen Interval |
|----------------------------|-----------------------------|---------------------------------|-------------------------------|------------------------------|--------------------------------------|
| <b>UPGRADIENT AREA</b>     |                             |                                 |                               |                              |                                      |
| SHL-12                     | 15.0 - 30.0                 | 232.22 - 217.22                 | 247.22                        | 248.62                       | Overburden                           |
| SHL-15                     | 14.5 - 24.5                 | 244.52 - 234.52                 | 259.02                        | 259.92                       | Overburden                           |
| SHL-17                     | 6.0 - 16.0                  | 225.88 - 215.88                 | 231.88                        | 233.79                       | Overburden                           |
| SHL-24                     | 110.0 - 120.0 <sup>1</sup>  | 126.79 - 116.79                 | 236.79                        | 238.75                       | OB/Till/BR                           |
| SHL-25                     | 23.5 - 33.5                 | 232.78 - 222.78                 | 256.28                        | 258.01                       | Overburden                           |
| SHM-93-24A                 | 13.2 - 23.2                 | 222.19 - 212.19                 | 235.39                        | 238.42                       | Overburden                           |
| SHL-7                      | 11.0 - 21.0                 | 223.79 - 213.79                 | 234.79                        | 236.33                       | Overburden                           |
| <b>LANDFILL AREA</b>       |                             |                                 |                               |                              |                                      |
| N5-P1                      | 95.5 - 97.5                 | 144.96 - 142.96                 | 240.46                        | 242.65                       | Bedrock                              |
| N5-P2                      | 23.0 - 28.0 <sup>1</sup>    | 217.46 - 212.46                 | 240.46                        | 242.69                       | Bedrock                              |
| N7-P1                      | 66.0 - 68.0 <sup>1</sup>    | 187.18 - 185.18                 | 253.18                        | 255.59                       | Bedrock                              |
| N7-P2                      | 29.0 - 34.0 <sup>1</sup>    | 224.18 - 219.18                 | 253.18                        | 256.04                       | Overburden                           |
| SHL-18                     | 16.0 - 26.0                 | 219.67 - 209.67                 | 235.67                        | 237.56                       | Overburden                           |
| SHM-93-18B                 | 78.5 - 88.5                 | 156.71 - 146.71                 | 235.21                        | 237.31                       | Overburden                           |
| SHM-10-07                  | 40.0 - 50.0                 | 204.98 - 194.98                 | 244.98                        | 246.82                       | Mid Overburden                       |
| SHM-10-12                  | 45.0 - 55.0                 | 207.57 - 197.57                 | 252.57                        | 255.17                       | Mid Overburden                       |
| SHM-10-13                  | 60.0 - 70.0                 | 181.51 - 171.51                 | 241.51                        | 244.77                       | Deep Overburden                      |
| SHM-10-14                  | 60.0 - 80.0                 | 174.80 - 154.80                 | 234.80                        | 237.62                       | Deep Overburden                      |
| SHM-10-15                  | 45.0 - 55.0                 | 196.95 - 186.95                 | 241.95                        | 243.68                       | Mid Overburden                       |
| SHP-95-27X                 | 30.5 - 40.5                 | 204.81 - 194.81                 | 235.31                        | 237.45                       | Overburden                           |
| SHP-99-01B                 | 4.0 - 8.0                   | 267.76 - 263.76                 | 271.76                        | 273.16                       | Shallow Overburden                   |
| SHP-99-01C                 | 19.7 - 29.7                 | 252.46 - 242.46                 | 272.16                        | 274.15                       | Bedrock                              |
| SHP-99-29X                 | 19.0 - 29.0                 | 222.46 - 212.46                 | 241.46                        | 243.34                       | Shallow Overburden                   |
| SHP-99-35X                 | 30.2 - 40.2                 | 226.50 - 216.50                 | 256.70                        | 258.23                       | Shallow Overburden                   |
| N6-P1                      | 85.5 - 87.5 <sup>1</sup>    | 170.56 - 168.53                 | 256.06                        | 259.60                       | Bedrock                              |
| SHM-10-11                  | 50.0 - 60.0                 | 211.16 - 201.16                 | 261.16                        | 263.76                       | Deep Overburden                      |
| SHP-2016-07A               | 22.0 - 32.0                 | 240.98 - 230.98                 | 262.98                        | 265.30                       | Bedrock                              |
| SHP-2016-07B               | 70.0 - 80.0                 | 192.98 - 182.98                 | 262.98                        | 265.33                       | Bedrock                              |
| <b>SHEPLEY'S HILL AREA</b> |                             |                                 |                               |                              |                                      |
| CH-1S                      | 36.0 - 41.0                 | 212.46 - 207.46                 | 248.46                        | 250.63                       | Bedrock                              |
| CH-1D                      | 85.0 - 95.0                 | 163.46 - 153.46                 | 248.46                        | 250.59                       | Bedrock                              |
| 2-1                        | UKN                         | UNK                             | 243.51                        | 245.90                       | UKN                                  |
| 2-2                        | UKN                         | UNK                             | 245.63                        | 248.06                       | UKN                                  |
| 20-1                       | 40.7 - 55.7                 | 237.01 - 222.01                 | 277.78                        | 278.52                       | Bedrock                              |
| 20-2                       | 0.0 - 25.2                  | 277.30 - 252.10                 | 277.3                         | 277.71                       | Bedrock                              |
| 27-1                       | 61.2 - 66.2                 | 209.89 - 204.89                 | 268.09                        | 270.66                       | Bedrock                              |
| 27-2                       | 60.4 - 70.4                 | 215.07 - 205.07                 | 273.07                        | 275.15                       | Bedrock                              |
| 27-30B-1                   | 36.3 - 46.3                 | 236.56 - 226.56                 | 271.56                        | 272.95                       | Bedrock                              |
| 27-30B-2                   | 0.0 - 22.5                  | 271.75 - 249.25                 | 271.75                        | 274.00                       | Bedrock                              |
| CAP-1B                     | 7.0 - 54.9                  | 236.13 - 188.23                 | 243.13                        | 245.98                       | Bedrock                              |
| CAP-2B                     | 54.0 - 59.0                 | 196.66 - 191.66                 | 248.66                        | 250.21                       | Bedrock                              |
| CAP-3                      | 6.0 - 40.0                  | 245.45 - 211.45                 | 251.45                        | 252.63                       | Bedrock                              |
| CAP-4                      | 9.0 - 13.8                  | 237.73 - 232.93                 | 246.73                        | 248.63                       | Bedrock                              |
| MW-1                       | 6.58 - 8.58 <sup>2</sup>    | 242.31 - 240.31                 | 248.89                        | 251.84                       | Overburden                           |
| MW-11A                     | 4.18 - 6.18 <sup>2</sup>    | 251.42 - 249.42                 | 255.60                        | 258.57                       | Overburden                           |
| MW-14                      | 5.14 - 7.14 <sup>2</sup>    | 248.61 - 246.61                 | 253.75                        | 256.61                       | Overburden                           |
| MW-16                      | 5.18 - 7.18 <sup>2</sup>    | 262.53 - 260.53                 | 267.71                        | 270.23                       | Overburden                           |
| MW-22                      | 4.70 - 6.70 <sup>2</sup>    | 260.83 - 258.83                 | 265.53                        | 267.64                       | Overburden                           |



**Table 1**  
**Area 2 Existing Monitoring Well Construction Information – AOC 5**  
**Area 2 Field Sampling Plan**  
**Devens PFAS Remedial Investigation Workplan**

| Well Identifier          | Screen Interval<br>(ft bgs) | Screen Elevation<br>(ft NAVD88) | Ground Surface<br>(ft NAVD88) | TOC Elevation<br>(ft NAVD88) | Formation Type at<br>Screen Interval |
|--------------------------|-----------------------------|---------------------------------|-------------------------------|------------------------------|--------------------------------------|
| MW-4-1                   | 3.72 - 5.72 <sup>2</sup>    | 241.67 - 239.67                 | 245.39                        | 247.33                       | Overburden                           |
| MW-7                     | 6.58 - 8.98 <sup>2</sup>    | 239.51 - 237.51                 | 246.09                        | 249.10                       | Overburden                           |
| MW-9                     | 7.65 - 9.65 <sup>2</sup>    | 233.40 - 231.40                 | 241.05                        | 243.91                       | Overburden                           |
| Q4-1                     | 30.0 - 40.0                 | 236.20 - 226.20                 | 266.20                        | 268.38                       | Bedrock                              |
| Q4-2                     | 8.5 - 53.0                  | 262.55 - 218.05                 | 271.05                        | 273.37                       | Bedrock                              |
| Q5-1                     | 49.3 - 54.3                 | 212.32 - 207.32                 | 259.32                        | 260.99                       | Bedrock                              |
| Q5-2                     | UKN                         | UNK                             | 259.14                        | 259.90                       | UKN                                  |
| 3-1                      | UKN                         | UNK                             | 264.10                        | 265.18                       | UKN                                  |
| Well 3-2                 | 55.0 - 60.0                 | 211.28 - 206.28                 | 267.28                        | 268.20                       | Bedrock                              |
| 3A-1                     | UKN                         | UNK                             | 266.05                        | 266.90                       | UKN                                  |
| 3A-2                     | 0 - 54.9                    | 263.27 - 208.37                 | 263.27                        | 264.56                       | Bedrock                              |
| <b>BARRIER WALL AREA</b> |                             |                                 |                               |                              |                                      |
| N1-P1                    | 65.0 - 70.0                 | 162.78 - 157.78                 | 227.78                        | 229.92                       | Deep Overburden                      |
| N1-P2                    | 40.0 - 45.0                 | 187.78 - 182.78                 | 227.78                        | 229.93                       | Mid Overburden                       |
| N1-P3                    | 12.0 - 17.0                 | 215.78 - 210.78                 | 227.78                        | 230.08                       | Shallow Overburden                   |
| N2-P1                    | 35.0 - 40.0                 | 185.55 - 180.55                 | 220.55                        | 222.16                       | Bedrock                              |
| N2-P2                    | 4.0 - 9.0                   | 216.55 - 211.55                 | 220.55                        | 222.01                       | Shallow Water Table                  |
| N3-P1                    | 33.0 - 35.0 <sup>1</sup>    | 185.81 - 183.81                 | 218.81                        | 220.83                       | Bedrock                              |
| N3-P2                    | 4.0 - 9.0 <sup>1</sup>      | 214.81 - 209.81                 | 218.81                        | 220.84                       | Shallow Water Table                  |
| SHL-10                   | 24.0 - 39.0                 | 222.62 - 207.62                 | 246.62                        | 248.02                       | Shallow Overburden                   |
| SHM-93-10C               | 44.0 - 54.0                 | 202.06 - 192.06                 | 246.06                        | 247.68                       | Bedrock                              |
| SHM-93-10D               | 46.0 - 56.0                 | 199.51 - 189.51                 | 245.51                        | 248.01                       | Bedrock                              |
| SHM-93-10E               | UKN                         | UNK                             | 245.60                        | 247.54                       | UKN                                  |
| SHL-11                   | 12.0 - 27.0                 | 221.95 - 206.95                 | 233.95                        | 235.47                       | Shallow Overburden                   |
| SHL-19                   | 20.0 - 30.0                 | 218.59 - 208.59                 | 238.59                        | 240.50                       | Shallow Overburden                   |
| SHL-20                   | 39.0 - 49.0                 | 195.72 - 185.72                 | 234.72                        | 235.95                       | Deep Overburden                      |
| SHL-3                    | 24.0 - 34.0                 | 221.80 - 211.80                 | 245.8                         | 246.95                       | Mid-Overburden                       |
| SHL-4                    | 3.0 - 13.0                  | 223.08 - 213.08                 | 226.08                        | 227.48                       | Shallow Overburden                   |
| SHM-11-02                | 39.0 - 49.0                 | 199.66 - 189.66                 | 238.66                        | 240.73                       | Bedrock                              |
| SHM-11-06                | 25.0 - 35.0                 | 208.33 - 198.33                 | 233.33                        | 236.17                       | Shallow Overburden                   |
| SHM-11-07                | 41.0 - 46.0                 | 197.22 - 192.22                 | 238.22                        | 240.83                       | Bedrock                              |
| SHP-01-36X               | 3.0 - 8.0                   | 216.97 - 211.97                 | 219.97                        | 223.95                       | Shallow Overburden                   |
| SHP-01-37X               | 1.0 - 6.0                   | 217.67 - 212.67                 | 218.67                        | 222.79                       | Shallow Overburden                   |
| SHP-01-38A               | 1.5 - 6.5                   | 217.27 - 212.27                 | 218.77                        | 220.86                       | Shallow Overburden                   |
| SHP-01-38B               | 18.0 - 23.0                 | 200.88 - 195.88                 | 218.88                        | 221.03                       | Deep Overburden                      |
| SHP-01-38Z               | UKN                         | UNK                             | 218.66                        | 220.75                       | UKN                                  |
| SHP-05-43                | 50.5 - 60.5                 | 207.88 - 197.88                 | 258.38                        | 260.71                       | Shallow Overburden                   |
| SHP-05-44                | 51.0 - 61.0                 | 204.56 - 194.56                 | 255.56                        | 258.14                       | Mid Overburden                       |
| PZ-12-01                 | 24.0 - 34.0                 | 209.85 - 109.85                 | 233.85                        | 237.55                       | Shallow Overburden                   |
| PZ-12-02                 | 24.0 - 34.0                 | 209.75 - 109.75                 | 233.75                        | 237.79                       | Shallow Overburden                   |
| PZ-12-03                 | 22.0 - 32.0                 | 210.85 - 200.85                 | 232.85                        | 236.40                       | Shallow Overburden                   |
| PZ-12-04                 | 22.0 - 32.0                 | 213.05 - 203.05                 | 235.05                        | 238.20                       | Shallow Overburden                   |
| PZ-12-05                 | 26.0 - 36.0                 | 210.08 - 200.08                 | 236.08                        | 238.73                       | Mid-Overburden                       |
| PZ-12-06                 | 26.0 - 36.0                 | 212.42 - 202.42                 | 238.42                        | 242.18                       | Mid-Overburden                       |
| PZ-12-07                 | 18.0 - 28.0                 | 222.80 - 212.80                 | 240.80                        | 244.59                       | Mid-Overburden                       |
| PZ-12-08                 | 18.0 - 28.0                 | 223.74 - 213.74                 | 241.74                        | 244.83                       | Mid-Overburden                       |
| PZ-12-09                 | 22.0 - 32.0                 | 216.43 - 206.43                 | 238.43                        | 241.93                       | Shallow Overburden                   |
| PZ-12-10                 | 22.0 - 32.0                 | 216.98 - 206.98                 | 238.98                        | 242.28                       | Shallow Overburden                   |
| RSK 1                    | 30.02 - 35.02               | 191.42 - 186.42                 | 221.44                        | 222.58                       | UKN                                  |
| RSK 2                    | 25.05 - 30.05               | 196.52 - 191.52                 | 221.57                        | 222.15                       | UKN                                  |

**Table 1**  
**Area 2 Existing Monitoring Well Construction Information – AOC 5**  
**Area 2 Field Sampling Plan**  
**Devens PFAS Remedial Investigation Workplan**

| Well Identifier       | Screen Interval<br>(ft bgs) | Screen Elevation<br>(ft NAVD88) | Ground Surface<br>(ft NAVD88) | TOC Elevation<br>(ft NAVD88) | Formation Type at<br>Screen Interval |
|-----------------------|-----------------------------|---------------------------------|-------------------------------|------------------------------|--------------------------------------|
| RSK 3                 | 20.01 - 25.01               | 201.82 - 196.82                 | 221.83                        | 222.95                       | UKN                                  |
| RSK 4                 | 14.67 - 19.67               | 207.02 - 202.02                 | 221.69                        | 222.97                       | UKN                                  |
| RSK 5                 | 9.96 - 14.96                | 211.72 - 206.72                 | 221.68                        | 222.75                       | UKN                                  |
| RSK 6                 | 20.12 - 25.12               | 201.42 - 196.42                 | 221.54                        | 222.49                       | UKN                                  |
| RSK 7                 | 4.24 - 9.24                 | 217.32 - 212.32                 | 221.56                        | 222.01                       | UKN                                  |
| RSK 8                 | 28.06 - 33.06               | 197.92 - 192.92                 | 225.98                        | 226.96                       | UKN                                  |
| RSK 9                 | 22.29 - 27.29               | 203.42 - 198.42                 | 225.71                        | 226.45                       | UKN                                  |
| RSK 10                | 17.2 - 22.2                 | 208.42 - 203.42                 | 225.62                        | 226.37                       | UKN                                  |
| RSK 11                | 12.35 - 17.35               | 213.72 - 208.72                 | 226.07                        | 226.75                       | UKN                                  |
| RSK 12                | 8.0 - 13.0                  | 217.63 - 212.63                 | 225.63                        | 226.42                       | UKN                                  |
| RSK 13                | 16.26 - 21.26               | 208.32 - 203.32                 | 224.58                        | 225.37                       | UKN                                  |
| RSK 14                | 12.35 - 17.35               | 212.12 - 207.12                 | 224.47                        | 225.30                       | UKN                                  |
| RSK 15                | 7.27 - 12.27                | 217.42 - 212.42                 | 224.69                        | 225.54                       | UKN                                  |
| RSK 16                | 16.72 - 21.72               | 201.32 - 196.32                 | 218.04                        | 218.58                       | UKN                                  |
| RSK 17                | 12.2 - 17.2                 | 205.52 - 200.52                 | 217.72                        | 218.85                       | UKN                                  |
| RSK 18                | 7.15 - 12.15                | 210.82 - 205.82                 | 217.97                        | 218.73                       | UKN                                  |
| RSK 19                | 2.06 - 7.06                 | 215.72 - 210.72                 | 217.78                        | 218.76                       | UKN                                  |
| RSK 20                | 12.13 - 17.13               | 205.92 - 200.92                 | 218.05                        | 219.05                       | UKN                                  |
| RSK 21                | 1.33 - 21.33                | 216.72 - 196.72                 | 218.05                        | 220.04                       | UKN                                  |
| RSK 23                | 5.31 - 30.31                | 222.22 - 197.22                 | 227.53                        | 227.80                       | UKN                                  |
| RSK 24                | 18.16 - 23.16               | 222.22 - 217.22                 | 240.38                        | 240.41                       | UKN                                  |
| RSK 25                | 20.21 - 25.21               | 219.32 - 214.32                 | 239.53                        | 239.21                       | UKN                                  |
| RSK 27                | 19.43 - 24.43               | 220.80 - 215.80                 | 240.23                        | 241.45                       | UKN                                  |
| RSK 28                | 19.62 - 24.62               | 218.62 - 213.62                 | 238.24                        | 239.24                       | UKN                                  |
| RSK 32                | 19.49 - 24.49               | 216.38 - 211.38                 | 235.87                        | 236.91                       | UKN                                  |
| RSK 34                | 17.84 - 22.84               | 215.71 - 210.71                 | 233.55                        | 233.16                       | UKN                                  |
| RSK 35                | 20.42 - 25.42               | 212.57 - 207.57                 | 232.99                        | 233.64                       | UKN                                  |
| RSK 36                | 3.70 - 23.70                | 216.35 - 196.35                 | 220.05                        | 220.22                       | UKN                                  |
| RSK 37                | 2.13 - 7.13                 | 217.51 - 212.51                 | 219.64                        | 220.55                       | UKN                                  |
| RSK 38                | 5.11 - 10.11                | 214.50 - 209.50                 | 219.61                        | 220.53                       | UKN                                  |
| RSK 39                | 9.91 - 14.91                | 209.65 - 204.65                 | 219.56                        | 220.33                       | UKN                                  |
| RSK 40                | 15.07 - 20.07               | 204.50 - 199.50                 | 219.57                        | 220.39                       | UKN                                  |
| RSK 41                | 20.09 - 25.09               | 199.44 - 194.44                 | 219.53                        | 220.41                       | UKN                                  |
| RSK 42                | 10.15 - 15.15               | 209.51 - 204.51                 | 219.66                        | 220.57                       | UKN                                  |
| RSK 43                | 3.91 - 23.91                | 215.71 - 195.71                 | 219.62                        | 220.43                       | UKN                                  |
| RSK 47                | 11.21 - 16.21               | 214.66 - 209.66                 | 225.87                        | 226.83                       | UKN                                  |
| RSK 50                | 2.31 - 2.81                 | 215.73 - 215.23                 | 218.04                        | 220.23                       | UKN                                  |
| <b>NEARFIELD AREA</b> |                             |                                 |                               |                              |                                      |
| SHL-13                | 5.0 - 20.0                  | 213.97 - 198.97                 | 218.98                        | 220.71                       | Shallow Overburden                   |
| SHL-21                | 42.0 - 52.0                 | 216.14 - 206.14                 | 258.14                        | 260.00                       | Overburden                           |
| SHL-22                | 105.0 - 115.0               | 113.90 - 103.90                 | 218.90                        | 219.58                       | Deep Overburden/Till                 |
| SHL-23                | 23.0 - 33.0                 | 216.44 - 206.44                 | 239.44                        | 241.29                       | Overburden                           |
| SHL-5                 | 3.0 - 13.0                  | 213.90 - 203.90                 | 216.90                        | 217.60                       | Shallow Overburden                   |
| SHL-8D                | 68.0 - 70.0                 | 150.83 - 148.83                 | 218.83                        | 220.78                       | Deep Overburden                      |
| SHL-8S                | 52.0 - 54.0                 | 166.83 - 164.83                 | 218.83                        | 220.97                       | Shallow Overburden                   |
| SHL-9                 | 15.0 - 25.0                 | 205.72 - 195.72                 | 220.72                        | 221.95                       | Shallow Overburden                   |
| SHM-05-41A            | 42.0 - 44.0                 | 180.72 - 178.72                 | 222.72                        | 222.48                       | Shallow Overburden                   |
| SHM-05-41B            | 62.0 - 64.0                 | 160.50 - 158.33                 | 222.50                        | 222.33                       | Mid Overburden                       |
| SHM-05-41C            | 88.0 - 93.0                 | 134.91 - 129.91                 | 222.91                        | 222.57                       | Deep Overburden/Till                 |
| SHM-05-42A            | 40.0 - 42.0                 | 173.65 - 171.65                 | 213.65                        | 216.81                       | Shallow Overburden                   |

**Table 1**  
**Area 2 Existing Monitoring Well Construction Information – AOC 5**  
**Area 2 Field Sampling Plan**  
**Devens PFAS Remedial Investigation Workplan**

| Well Identifier             | Screen Interval<br>(ft bgs) | Screen Elevation<br>(ft NAVD88) | Ground Surface<br>(ft NAVD88) | TOC Elevation<br>(ft NAVD88) | Formation Type at<br>Screen Interval |
|-----------------------------|-----------------------------|---------------------------------|-------------------------------|------------------------------|--------------------------------------|
| SHM-05-42B                  | 70.0 - 72.0                 | 143.65 - 141.65                 | 213.65                        | 216.80                       | Mid Overburden                       |
| SHM-10-06                   | 69.5 - 79.5                 | 160.53 - 150.53                 | 230.03                        | 232.91                       | Deep Overburden                      |
| SHM-10-06A                  | 77.0 - 87.0                 | 168.96 - 158.96                 | 245.96                        | 248.54                       | Deep Overburden                      |
| SHM-10-16                   | 75.0 - 85.0                 | 141.72 - 131.72                 | 216.72                        | 219.23                       | Deep Overburden                      |
| SHM-93-22B                  | 82.3 - 92.3                 | 136.54 - 126.54                 | 218.84                        | 219.39                       | Mid-depth Overburden                 |
| SHM-93-22C                  | 124.3 - 134.3               | 94.62 - 84.62                   | 218.92                        | 220.69                       | Deep Bedrock                         |
| SHM-96-5B                   | 80.0 - 90.0                 | 137.38 - 127.38                 | 217.38                        | 218.92                       | Sand/Till                            |
| SHM-96-5C                   | 50.0 - 60.0                 | 167.39 - 157.39                 | 217.39                        | 218.39                       | Mid Overburden                       |
| SHP-05-45A                  | 20.0 - 25.0                 | 206.32 - 201.32                 | 226.32                        | 228.48                       | Shallow Overburden                   |
| SHP-05-45B                  | 65.0 - 75.0                 | 161.72 - 151.72                 | 226.72                        | 229.11                       | Mid Overburden                       |
| SHP-05-46A                  | 20.0 - 25.0                 | 206.30 - 201.30                 | 226.31                        | 228.18                       | Mid Overburden                       |
| SHP-05-46B                  | 65.0 - 75.0                 | 161.03 - 151.03                 | 226.03                        | 227.60                       | Shallow Overburden                   |
| SHP-05-47A                  | 1.0 - 2.0                   | 212.35 - 211.35                 | 213.35                        | 217.39                       | Shallow Water Table                  |
| SHP-05-47B                  | 3.0 - 4.0                   | 210.33 - 209.33                 | 213.33                        | 215.40                       | Shallow Water Table                  |
| SHP-2017-01                 | 70.0 - 75.0                 | 157.22 - 152.22                 | 227.22                        | 229.63                       | Overburden                           |
| SHP-2017-02                 | 85.0 - 90.0                 | 142.26 - 137.26                 | 227.26                        | 230.05                       | Overburden                           |
| EPA-PZ-2012-1A              | 20.0 - 25.0                 | 199.90 - 194.90                 | 219.91                        | 223.79                       | Shallow Overburden                   |
| EPA-PZ-2012-1B              | 70.0 - 75.0                 | 149.81 - 144.81                 | 219.81                        | 223.53                       | Deep Overburden                      |
| EPA-PZ-2012-2A              | 20.0 - 25.0                 | 199.72 - 194.72                 | 219.72                        | 223.38                       | Shallow Overburden                   |
| EPA-PZ-2012-2B              | 75.0 - 80.0                 | 144.75 - 139.75                 | 219.76                        | 223.37                       | Deep Overburden                      |
| EPA-PZ-2012-3A              | 20.0 - 25.0                 | 199.19 - 194.19                 | 219.20                        | 222.65                       | Shallow Overburden                   |
| EPA-PZ-2012-3B              | 70.0 - 75.0                 | 149.25 - 144.25                 | 219.25                        | 222.57                       | Deep Overburden                      |
| EPA-PZ-2012-4A              | 20.0 - 25.0                 | 203.30 - 198.30                 | 223.30                        | 226.60                       | Shallow Overburden                   |
| EPA-PZ-2012-4B              | 70.0 - 75.0                 | 153.51 - 148.51                 | 223.51                        | 226.39                       | Deep Overburden                      |
| EPA-PZ-2012-5A              | 20.0 - 25.0                 | 196.33 - 191.33                 | 216.33                        | 220.01                       | Shallow Overburden                   |
| EPA-PZ-2012-5B              | 80.0 - 85.0                 | 136.20 - 131.20                 | 216.20                        | 219.38                       | Deep Overburden                      |
| EPA-PZ-2012-6A              | 25.0 - 30.0                 | 205.71 - 200.71                 | 230.71                        | 234.25                       | Shallow Overburden                   |
| EPA-PZ-2012-6B              | 75.0 - 80.0                 | 155.85 - 150.85                 | 230.85                        | 234.08                       | Deep Overburden                      |
| EPA-PZ-2012-7A              | 25.0 - 30.0                 | 209.42 - 204.42                 | 234.42                        | 234.16                       | Shallow Overburden                   |
| EPA-PZ-2012-7B              | 60.0 - 65.0                 | 174.28 - 169.28                 | 234.28                        | 234.03                       | Deep Overburden                      |
| SHP-2016-1A                 | 13.9 - 23.0                 | 211.69 - 201.69                 | 224.69                        | 227.27                       | Shallow Overburden                   |
| SHP-2016-1B                 | 75.0 - 85.0                 | 149.68 - 139.68                 | 224.69                        | 227.24                       | Deep Overburden                      |
| SHP-2016-2A                 | 20.0 - 25.0                 | 203.72 - 198.72                 | 223.73                        | 225.93                       | Shallow Overburden                   |
| SHP-2016-2B                 | 80.0 - 85.0                 | 143.72 - 138.72                 | 223.73                        | 225.95                       | Deep Overburden                      |
| SHP-2016-3A                 | 20.0 - 25.0                 | 201.12 - 196.12                 | 221.13                        | 223.18                       | Shallow Overburden                   |
| SHP-2016-3B                 | 80.0 - 85.0                 | 141.12 - 136.12                 | 221.13                        | 223.18                       | Deep Overburden                      |
| SHP-2016-4A                 | 25.0 - 30.0                 | 202.57 - 197.57                 | 227.57                        | 229.97                       | Shallow Overburden                   |
| SHP-2016-4B                 | 85.0 - 90.0                 | 142.57 - 137.57                 | 227.57                        | 229.75                       | Deep Overburden                      |
| SHP-2016-5A                 | 25.0 - 30.0                 | 199.87 - 194.87                 | 224.88                        | 227.01                       | Shallow Overburden                   |
| SHP-2016-5B                 | 85.0 - 90.0                 | 139.87 - 134.87                 | 224.88                        | 226.95                       | Deep Overburden                      |
| SHP-2016-06A                | 81.0 - 86.0                 | 159.05 - 154.05                 | 240.05                        | 241.90                       | Bedrock                              |
| SHP-2016-06B                | 102.0 - 112.0               | 138.05 - 128.05                 | 240.05                        | 241.89                       | Bedrock                              |
| SHP-2016-06C                | 123.0 - 133.0               | 117.05 - 107.05                 | 240.05                        | 241.92                       | Bedrock                              |
| <b>NORTHERN IMPACT AREA</b> |                             |                                 |                               |                              |                                      |
| SHM-10-01                   | 60.5 - 70.5                 | 146.19 - 136.69                 | 206.69                        | 209.65                       | Deep Overburden/Till                 |
| SHM-10-02                   | 53.0 - 63.0                 | 167.19 - 157.19                 | 220.19                        | 223.03                       | Mid Overburden                       |
| SHM-10-03                   | 58.5 - 68.5                 | 171.27 - 161.27                 | 229.77                        | 232.05                       | Mid Overburden                       |
| SHM-10-04                   | 55.0 - 65.0                 | 155.00 - 145.00                 | 210.00                        | 212.61                       | Mid Overburden                       |
| SHM-10-05A                  | 50.0 - 60.0                 | 185.41 - 175.41                 | 235.41                        | 235.09                       | Mid Overburden                       |
| SHM-10-08                   | 46.0 - 56.0                 | 165.86 - 155.86                 | 211.86                        | 214.36                       | Deep OB / Till                       |

**Table 1**  
**Area 2 Existing Monitoring Well Construction Information – AOC 5**  
**Area 2 Field Sampling Plan**  
**Devens PFAS Remedial Investigation Workplan**

| Well Identifier         | Screen Interval<br>(ft bgs) | Screen Elevation<br>(ft NAVD88) | Ground Surface<br>(ft NAVD88) | TOC Elevation<br>(ft NAVD88) | Formation Type at<br>Screen Interval |
|-------------------------|-----------------------------|---------------------------------|-------------------------------|------------------------------|--------------------------------------|
| SHM-10-10               | 56.0 - 66.0                 | 159.40 - 149.40                 | 215.40                        | 217.11                       | Deep OB / Till                       |
| SHM-05-39A              | 37.0 - 39.0                 | 184.79 - 182.79                 | 221.79                        | 221.53                       | Mid Overburden                       |
| SHM-05-39B              | 66.0 - 68.0                 | 155.77 - 153.77                 | 221.77                        | 221.51                       | Deep Overburden                      |
| SHM-13-01               | 39.0 - 49.0                 | 166.77 - 156.77                 | 205.77                        | 208.08                       | Mid Overburden                       |
| SHM-13-02               | 60.0 - 70.0                 | 156.92 - 146.92                 | 216.92                        | 218.72                       | Deep Overburden                      |
| SHM-13-05               | 75.0 - 85.0                 | 150.39 - 140.39                 | 225.39                        | 225.14                       | Deep Overburden                      |
| SHM-13-14D              | 45.0 - 55.0                 | 162.48 - 152.48                 | 207.48                        | 210.48                       | Deep Overburden                      |
| SHM-13-14S              | 5.0 - 15.0                  | 202.67 - 192.67                 | 207.67                        | 210.55                       | Shallow Overburden                   |
| SHM-13-15               | 50.0 - 60.0                 | 155.98 - 145.98                 | 205.98                        | 210.58                       | Deep Overburden                      |
| SHM-99-32X              | 72.0 - 82.0                 | 147.12 - 137.12                 | 219.12                        | 221.28                       | Deep Overburden                      |
| SHM-99-31A              | 4.0 - 14.0                  | 208.82 - 198.82                 | 212.82                        | 214.34                       | Shallow OB / WT                      |
| SHM-99-31B              | 50.0 - 60.0                 | 162.52 - 152.52                 | 212.52                        | 214.39                       | Mid Overburden                       |
| SHM-99-31C              | 68.0 - 78.0                 | 144.64 - 134.64                 | 212.64                        | 214.60                       | Deep Overburden                      |
| SHP-99-33A              | 10.5 - 15.5                 | 210.56 - 205.56                 | 221.06                        | 223.03                       | Overburden                           |
| SHP-99-33B              | 74.5 - 79.5                 | 146.66 - 141.66                 | 221.16                        | 222.65                       | Overburden                           |
| SHM-99-34B              | 74.5-79.5                   | 148.19 - 143.19                 | 222.69                        | 224.91                       | Deep Overburden                      |
| SHP-05-48A              | 1.0 - 2.0                   | 212.08 - 211.08                 | 213.09                        | 217.31                       | Shallow Water Table                  |
| SHP-05-48B              | 2.0 - 3.0                   | 211.03 - 210.03                 | 213.03                        | 215.96                       | Shallow Water Table                  |
| SHP-05-49A              | 1.0 - 2.0                   | 211.34 - 210.34                 | 212.34                        | 216.67                       | Shallow Water Table                  |
| SHP-05-49B              | 2.5 - 3.5                   | 209.89 - 208.89                 | 212.39                        | 215.14                       | Shallow Water Table                  |
| SHM-05-40X              | 32.0 - 34.0                 | 191.48 - 189.48                 | 223.48                        | 223.19                       | Mid Overburden/Till                  |
| SHM-07-03               | 25.0 - 35.0                 | 202.96 - 192.96                 | 227.96                        | 227.90                       | Shallow Overburden                   |
| SHM-07-05X              | 56.0 - 66.0                 | 167.66 - 157.66                 | 223.66                        | 223.40                       | Mid Overburden                       |
| SHM-13-03               | 42.0 - 52.0                 | 167.91 - 157.91                 | 209.91                        | 212.05                       | Deep OB / Till                       |
| SHM-13-04               | 20.0 - 30.0                 | 207.34 - 197.34                 | 227.34                        | 227.02                       | Shallow Overburden                   |
| SHM-13-06               | 36.0 - 46.0                 | 188.23 - 178.23                 | 224.23                        | 223.89                       | Deep Overburden/Till                 |
| SHM-13-07               | 27.0 - 37.0                 | 199.11 - 189.11                 | 226.11                        | 225.64                       | Unknown                              |
| SHM-13-08               | 55.0 - 65.0                 | 173.19 - 163.19                 | 228.19                        | 227.90                       | Mid Overburden/Till                  |
| <b>EXTRACTION WELLS</b> |                             |                                 |                               |                              |                                      |
| EW-1                    | 60.0 - 85.0                 | 166.97 - 141.97                 | 226.97                        | 226.80                       | Overburden                           |
| EW-4                    | 70.0 - 95.0                 | 157.36 - 202.36                 | 227.36                        | 227.03                       | Overburden                           |

Notes:

<sup>1</sup> estimated value derived from Supplemental Groundwater Investigation (Harding ESE, 2003).

<sup>2</sup> screen interval approximated based boring log depth and depth to bottom (no well construction log)

ft bgs = feet below ground surface

ft = feet

PFAS = per- and polyfluoroalkyl substances

UKN = unknown

Wells designated to be sampled in RI

**Table 2**  
**Area 2 Existing Monitoring Well Sampling Summary**  
**Area 2 Field Sampling Plan**  
**Devens PFAS Remedial Investigation Workplan**

| Location                        | Location Identifier | Sample Name*         | Sample Type   |
|---------------------------------|---------------------|----------------------|---------------|
| AOC 5<br>(Upgradient Area)      | SHM-93-24A          | SHM-93-24A-MONYY     | Native Sample |
|                                 | SHL-12**            | NA                   | Native Sample |
|                                 | SHL-15 **           | NA                   | Native Sample |
|                                 | SHL-17 **           | NA                   | Native Sample |
|                                 | SHL-25 **           | NA                   | Native Sample |
| AOC 5<br>(Landfill Area)        | N6-P1               | N6-P1-MONYY          | Native Sample |
|                                 | N7-P1               | N7-P1-MONYY          | Native Sample |
|                                 | N7-P2               | N7-P2-MONYY          | Native Sample |
|                                 | SHM-10-11           | SHM-10-11-MONYY      | Native Sample |
| AOC 5<br>(Barrier Wall Area)    | N2-P1               | N2-P1-MONYY          | Native Sample |
|                                 | SHL-4               | SHL-4-MONYY          | Native Sample |
|                                 | SHM-11-06           | SHM-11-06-MONYY      | Native Sample |
|                                 | SHP-01-38B          | SHP-01-38B-MONYY     | Native Sample |
|                                 | SHP-05-43           | SHP-05-43-MONYY      | Native Sample |
|                                 | SHP-05-44           | SHP-05-44-MONYY      | Native Sample |
| AOC 5<br>(Nearfield Area)       | SHL-5               | SHL-5-MONYY          | Native Sample |
|                                 | SHM-05-41A          | SHM-05-41A-MONYY     | Native Sample |
|                                 | SHM-05-41B          | SHM-05-41B-MONYY     | Native Sample |
|                                 | SHM-05-41C          | SHM-05-41C-MONYY     | Native Sample |
|                                 | SHM-05-42A          | SHM-05-42A-MONYY     | Native Sample |
|                                 | SHM-05-42B          | SHM-05042B-MONYY     | Native Sample |
|                                 | SHM-10-06           | SHM-10-06-MONYY      | Native Sample |
|                                 | SHM-10-16           | SHM-10-16-MONYY      | Native Sample |
|                                 | SHM-96-5B           | SHM-96-5B-MONYY      | Native Sample |
|                                 | SHM-96-5C           | SHM-96-5C-MONYY      | Native Sample |
|                                 | SHP-05-46A          | SHP-05-46A-MONYY     | Native Sample |
|                                 | SHP-05-46B          | SHP-05-46B-MONYY     | Native Sample |
|                                 | EPA-PZ-2012-2A      | EPA-PZ-2012-2A-MONYY | Native Sample |
|                                 | EPA-PZ-2012-2B      | EPA-PZ-2012-2B-MONYY | Native Sample |
|                                 | EPA-PZ-2012-3A      | EPA-PZ-2012-3A-MONYY | Native Sample |
|                                 | EPA-PZ-2012-3B      | EPA-PZ-2012-3B-MONYY | Native Sample |
|                                 | SHP-2016-1A         | SHP-2016-1A-MONYY    | Native Sample |
|                                 | SHP-2016-1B         | SHP-2016-1B-MONYY    | Native Sample |
|                                 | SHP-2016-2A         | SHP-2016-2A-MONYY    | Native Sample |
|                                 | SHP-2016-2B         | SHP-2016-2B-MONYY    | Native Sample |
|                                 | SHP-2016-06A        | SHP-2016-06A         | Native Sample |
|                                 | SHP-2016-06B        | SHP-2016-06B         | Native Sample |
|                                 | SHP-2016-06C        | SHP-2016-06C         | Native Sample |
| AOC 5<br>(Northern Impact Area) | SHM-10-03           | SHM-10-03-MONYY      | Native Sample |
|                                 | SHM-10-10           | SHM-10-10-MONYY      | Native Sample |
|                                 | SHM-13-15           | SHM-13-15-MONYY      | Native Sample |
|                                 | SHP-99-33A          | SHP-99-33A-MONYY     | Native Sample |
|                                 | SHP-99-33B          | SHP-99-33B-MONYY     | Native Sample |
|                                 | SHM-05-40X          | SHM-05-40X-MONYY     | Native Sample |

**Table 2**  
**Area 2 Existing Monitoring Well Sampling Summary**  
**Area 2 Field Sampling Plan**  
**Devens PFAS Remedial Investigation Workplan**

| Location   | Location Identifier | Sample Name*       | Sample Type   |
|------------|---------------------|--------------------|---------------|
|            | SHM-07-03           | SHM-07-03-MONYY    | Native Sample |
|            | SHM-13-03           | SHM-13-03-MONYY    | Native Sample |
|            | SHM-13-04           | SHM-13-04-MONYY    | Native Sample |
|            | SHM-13-08           | SHM-13-08-MONYY    | Native Sample |
| AOC 32/43A | 32M-01-13XBR        | 32M-01-13XBR-MONYY | Native Sample |
|            | 32M-01-14XBR        | 32M-01-14XBR-MONYY | Native Sample |
|            | 32M-01-14XOB        | 32M-01-14XOB-MONYY | Native Sample |
|            | 32M-01-15XBR        | 32M-01-15XBR-MONYY | Native Sample |
|            | 32M-01-16XBR        | 32M-01-16XBR-MONYY | Native Sample |
|            | 32M-01-17XBR        | 32M-01-17XBR-MONYY | Native Sample |
|            | 32M-01-18XBR        | 32M-01-18XBR-MONYY | Native Sample |
|            | 32M-92-01X          | 32M-92-01X-MONYY   | Native Sample |
|            | 32M-92-03X          | 32M-92-03X-MONYY   | Native Sample |
|            | 32X-99-02X          | 32X-99-02X-MONYY   | Native Sample |
|            | 32Z-01-05XOB        | 32Z-01-05XOB-MONYY | Native Sample |
|            | 32Z-01-06XBR        | 32Z-01-06XBR-MONYY | Native Sample |
|            | 32Z-01-07XOB        | 32Z-01-07XOB-MONYY | Native Sample |
|            | 32Z-01-08XOB        | 32Z-01-08XOB-MONYY | Native Sample |
|            | 32Z-01-09XOB        | 32Z-01-09XOB-MONYY | Native Sample |
|            | 32Z-01-10XBR        | 32Z-01-10XBR-MONYY | Native Sample |
|            | 32Z-01-11XBR        | 32Z-01-11XBR-MONYY | Native Sample |
|            | 32Z-01-12XBR        | 32Z-01-12XBR-MONYY | Native Sample |
|            | 43M-01-16XBR        | 43M-01-16XBR-MONYY | Native Sample |
|            | 43M-01-16XOB        | 43M-01-16XOB-MONYY | Native Sample |
|            | 43M-01-17XBR        | 43M-01-17XBR-MONYY | Native Sample |
|            | 43M-01-17XOB        | 43M-01-17XOB-MONYY | Native Sample |
|            | 43M-01-20XBR        | 43M-01-20XBR-MONYY | Native Sample |
|            | 43M-01-20XOB        | 43M-01-20XOB-MONYY | Native Sample |
|            | SHL-12              | SHL-12-MONYY       | Native Sample |
|            | SHL-15              | SHL-15-MONYY       | Native Sample |
|            | SHL-16              | SHL-16-MONYY       | Native Sample |
|            | SHL-17              | SHL-17-MONYY       | Native Sample |
|            | SHL-25              | SHL-25-MONYY       | Native Sample |
| AOC 43G    | AAFES-2             | AAFES-2-MONYY      | Native Sample |
|            | AAFES-5             | AAFES-5-MONYY      | Native Sample |
|            | AAFES-6R            | AAFES-6R-MONYY     | Native Sample |
|            | AAFES-7             | AAFES-7-MONYY      | Native Sample |
|            | XGM-93-01X          | XGM-93-01X-MONYY   | Native Sample |
|            | XGM-93-02X          | XGM-93-02X-MONYY   | Native Sample |
|            | XGM-94-04X          | XGM-94-04X-MONYY   | Native Sample |
|            | XGM-94-06X          | XGM-94-06X-MONYY   | Native Sample |
|            | XGM-94-07X          | XGM-94-07X-MONYY   | Native Sample |
|            | XGM-94-08X          | XGM-94-08X-MONYY   | Native Sample |
|            | XGM-94-09X          | XGM-94-09X-MONYY   | Native Sample |

**Table 2**  
**Area 2 Existing Monitoring Well Sampling Summary**  
**Area 2 Field Sampling Plan**  
**Devens PFAS Remedial Investigation Workplan**

| Location                          | Location Identifier | Sample Name*         | Sample Type     |
|-----------------------------------|---------------------|----------------------|-----------------|
|                                   | XGM-94-10X          | XGM-94-10X-MONYY     | Native Sample   |
|                                   | XGM-97-12X          | XGM-97-12X-MONYY     | Native Sample   |
| AOC 43J                           | 2446-03             | 2446-03-MONYY        | Native Sample   |
|                                   | HA-1B               | HA-1B-MONYY          | Native Sample   |
|                                   | HA-1S               | HA-1S-MONYY          | Native Sample   |
|                                   | HA-4B               | HA-4B-MONYY          | Native Sample   |
|                                   | HA-4S               | HA-4S-MONYY          | Native Sample   |
|                                   | HA-5S               | HA-5S-MONYY          | Native Sample   |
|                                   | XJM-93-01X          | XJM-93-01X           | Native Sample   |
|                                   | XJM-93-04X          | XJM-93-04X           | Native Sample   |
|                                   | XJM-94-07X          | XJM-94-07X           | Native Sample   |
|                                   | XJM-97-12X          | XJM-97-12X           | Native Sample   |
| MacPherson<br>(with AOC 69 wells) | 69WP-08-01          | 69WP-08-01-MONYY     | Native Sample   |
|                                   | ZWM-95-01X          | ZWM-95-01X-MONYY     | Native Sample   |
|                                   | ZWM-95-17X          | ZWM-95-17X-MONYY     | Native Sample   |
|                                   | ZWM-95-18X          | ZWM-95-18X-MONYY     | Native Sample   |
|                                   | ZWM-01-25X          | ZWM-01-25X-MONYY     | Native Sample   |
|                                   | MPP-93-01           | MPP-93-01-MONYY      | Native Sample   |
|                                   | MPP-93-02           | MPP-93-01-MONYY      | Native Sample   |
|                                   | MPP-93-03           | MPP-93-01-MONYY      | Native Sample   |
| QC Samples ***                    | N2-P1               | A2-MW-DUP-MMDDYY     | Field Duplicate |
|                                   | SHM-05-42A          | A2-MW-DUP-MMDDYY     | Field Duplicate |
|                                   | SHM-93-24A          | A2-MW-DUP-MMDDYY     | Field Duplicate |
|                                   | SHP-01-38B          | A2-MW-DUP-MMDDYY     | Field Duplicate |
|                                   | SHM-05-41A          | A2-MW-DUP-MMDDYY     | Field Duplicate |
|                                   | 32Z-01-07XOB        | A2-MW-DUP-MMDDYY     | Field Duplicate |
|                                   | 32M-91-01X          | A2-MW-DUP-MMDDYY     | Field Duplicate |
|                                   | 43M-01-20XBR        | A2-MW-DUP-MMDDYY     | Field Duplicate |
|                                   | XGM-93-01X          | A2-MW-DUP-MMDDYY     | Field Duplicate |
|                                   | HA-4B               | A2-MW-DUP-MMDDYY     | Field Duplicate |
|                                   | ZWM-95-01X          | A2-MW-DUP-MMDDYY     | Field Duplicate |
|                                   | EPA-PZ-2012-2A      | EPA-PZ-2012-2A-MONYY | MS/MSD          |
|                                   | SHM-10-11           | SHM-10-11-MONYY      | MS/MSD          |
|                                   | SHM-05-42A          | SHM-05-42A-MONYY     | MS/MSD          |
|                                   | 43M-01-20XBR        | 43M-01-20XBR-MONYY   | MS/MSD          |
|                                   | XGM-93-01X          | XGM-93-01X-MONYY     | MS/MSD          |
|                                   | 69WP-08-01          | 69WP-08-01-MONYY     | MS/MSD          |
|                                   | NA                  | A2-MW-EB-MMDDYY      | Equipment Blank |
|                                   | NA                  | A2-MW-FRB-MMDDYY     | Field Blank     |

Notes:

All samples will be analyzed for PFAS via isotope dilution. Analyte list is specified in UFP-QAPP Worksheet #15.

\* = The sample name will consist of the well identifier followed by the month and the year the sample was collected.

The month will be represented by three letters and the year by two numbers.

\*\* = The wells will be sampled as part of AOC 32 activities.

**Table 2**  
**Area 2 Existing Monitoring Well Sampling Summary**  
**Area 2 Field Sampling Plan**  
**Devens PFAS Remedial Investigation Workplan**

| Location | Location Identifier | Sample Name* | Sample Type |
|----------|---------------------|--------------|-------------|
|----------|---------------------|--------------|-------------|

\*\*\* Field Quality Control Samples (FD, MS/MSD, EBs and Field Reagent Blanks) will be collected at a frequency specified in UFP-QAPP worksheet #20. The FD will be collected at a 10% frequency, MS/MSD will be collected at a 5% frequency, EB will be collected at least once a week per piece of equipment, the FRB will be collected is at least once during each sampling event. The frequency will be applied to all of Area 2. The QC samples IDs are approximated and can change based on field conditions. Equipment blanks only collected if non-disposal equipment is used. Only one EB and FRB sample IDs are shown, but the appropriate number will be collected.

AOC = area of contamination

EB = equipment rinsate blank

FRB = field reagent blank

FD = field duplicate

MS/MSD = matrix spike/matrix spike duplicate

QC = quality control



**Table 3**  
**Area 2 Surface Water and Sediment Sampling Summary**  
**Area 2 Field Sampling Plan**  
**Devens PFAS Remedial Investigation Workplan**

| Location         | Location Identifier | Sample Name*       | Sample Matrix | Sample Type   | Sample Location**                  |
|------------------|---------------------|--------------------|---------------|---------------|------------------------------------|
| Plow Shop Pond   | PS-18-01            | PS-SW-18-01-MONYY  | surface water | Native Sample | Shoreline                          |
|                  |                     | PS-SED-18-01-MONYY | sediment      | Native Sample |                                    |
|                  | PS-18-02            | PS-SW-18-02-MONYY  | surface water | Native Sample | Shoreline                          |
|                  |                     | PS-SED-18-02-MONYY | sediment      | Native Sample |                                    |
|                  | PS-18-03            | PS-SW-18-03-MONYY  | surface water | Native Sample | Shoreline                          |
|                  |                     | PS-SED-18-03-MONYY | sediment      | Native Sample |                                    |
|                  | PS-18-04            | PS-SW-18-04-MONYY  | surface water | Native Sample | Shoreline                          |
|                  |                     | PS-SED-18-04-MONYY | sediment      | Native Sample |                                    |
|                  | PS-18-05            | PS-SW-18-05-MONYY  | surface water | Native Sample | Shoreline                          |
|                  |                     | PS-SED-18-05-MONYY | sediment      | Native Sample |                                    |
|                  | PS-18-06            | PS-SW-18-06-MONYY  | surface water | Native Sample | Shoreline                          |
|                  |                     | PS-SED-18-06-MONYY | sediment      | Native Sample |                                    |
| Nonacoicus Brook | NB-18-01            | NB-SW-18-01-MONYY  | surface water | Native Sample | Main Channel                       |
|                  |                     | NB-SED-18-01-MONYY | sediment      | Native Sample |                                    |
|                  | NB-18-02            | NB-SW-18-02-MONYY  | surface water | Native Sample | Shoreline<br>(south side of brook) |
|                  |                     | NB-SED-18-02-MONYY | sediment      | Native Sample |                                    |
|                  | NB-18-03            | NB-SW-18-03-MONYY  | surface water | Native Sample | Shoreline<br>(south side of brook) |
|                  |                     | NB-SED-18-03-MONYY | sediment      | Native Sample |                                    |
|                  | NB-18-04            | NB-SW-18-04-MONYY  | surface water | Native Sample | Main Channel                       |
|                  |                     | NB-SED-18-04-MONYY | sediment      | Native Sample |                                    |
|                  | NB-18-05            | NB-SW-18-05-MONYY  | surface water | Native Sample | Main Channel                       |
|                  |                     | NB-SED-18-05-MONYY | sediment      | Native Sample |                                    |
|                  | NB-18-06            | NB-SW-18-06-MONYY  | surface water | Native Sample | Main Channel                       |
|                  |                     | NB-SED-18-06-MONYY | sediment      | Native Sample |                                    |
|                  | NB-18-07            | NB-SW-18-07-MONYY  | surface water | Native Sample | Main Channel                       |
|                  |                     | NB-SED-18-07-MONYY | sediment      | Native Sample |                                    |
| Willow Brook     | WB-18-01            | WB-SW-18-01-MONYY  | surface water | Native Sample | Main Channel                       |
|                  |                     | WB-SED-18-01-MONYY | sediment      | Native Sample |                                    |
|                  | WB-18-02            | WB-SW-18-02-MONYY  | surface water | Native Sample | Shoreline<br>(west side of brook)  |
|                  |                     | WB-SED-18-02-MONYY | sediment      | Native Sample |                                    |
|                  | WB-18-03            | WB-SW-18-03-MONYY  | surface water | Native Sample | Shoreline<br>(west side of brook)  |
|                  |                     | WB-SED-18-03-MONYY | sediment      | Native Sample |                                    |
|                  | WB-18-04            | WB-SW-18-04-MONYY  | surface water | Native Sample | Main Channel                       |
|                  |                     | WB-SED-18-04-MONYY | sediment      | Native Sample |                                    |
|                  | WB-18-05            | WB-SW-18-05-MONYY  | surface water | Native Sample | Main Channel                       |
|                  |                     | WB-SED-18-05-MONYY | sediment      | Native Sample |                                    |
|                  | WB-18-06            | WB-SW-18-06-MONYY  | surface water | Native Sample | Main Channel                       |
|                  |                     | WB-SED-18-06-MONYY | sediment      | Native Sample |                                    |

**Table 3**  
**Area 2 Surface Water and Sediment Sampling Summary**  
**Area 2 Field Sampling Plan**  
**Devens PFAS Remedial Investigation Workplan**

| Location                                    | Location Identifier | Sample Name*       | Sample Matrix | Sample Type         | Sample Location**                  |
|---|---------------------|--------------------|---------------|---------------------|------------------------------------|
| Robbins Pond                                | RP-18-01            | RP-SW-18-01-MONYY  | surface water | Native Sample       | Shoreline                          |
|   |                     | RP-SED-18-01-MONYY | sediment      | Native Sample       |                                    |
|   | RP-18-02            | RP-SW-18-02-MONYY  | surface water | Native Sample       | Shoreline                          |
|   |                     | RP-SED-18-02-MONYY | sediment      | Native Sample       |                                    |
|   | RP-18-03            | RP-SW-18-03-MONYY  | surface water | Native Sample       | Shoreline                          |
|   |                     | RP-SED-18-03-MONYY | sediment      | Native Sample       |                                    |
| Unnamed Tributary<br>(Robbins Pond)         | UT-18-01            | UT-SW-18-01-MONYY  | surface water | Native Sample       | Main Channel                       |
|   |                     | UT-SED-18-01-MONYY | sediment      | Native Sample       |                                    |
|   | UT-18-02            | UT-SW-18-02-MONYY  | surface water | Native Sample       | Main Channel                       |
|   |                     | UT-SED-18-02-MONYY | sediment      | Native Sample       |                                    |
|   | UT-18-03            | UT-SW-18-03-MONYY  | surface water | Native Sample       | Main Channel                       |
|   |                     | UT-SED-18-03-MONYY | sediment      | Native Sample       |                                    |
| Detention Pond                              | DP-18-01            | DP-SW-18-01-MONYY  | surface water | Native Sample       | Shoreline                          |
|   |                     | DP-SED-18-01-MONYY | sediment      | Native Sample       |                                    |
| Surface Water and Sediment<br>QC Samples*** | WB-18-05            | A2-SW-DUP-MMDDYY   | surface water | Field Duplicate     | Main Channel                       |
|   |                     | A2-SED-DUP-MMDDYY  | sediment      | Field Duplicate     |                                    |
|   | RP-18-03            | A2-SW-DUP-MMDDYY   | surface water | Field Duplicate     | Shoreline                          |
|   |                     | A2-SED-DUP-MMDDYY  | sediment      | Field Duplicate     |                                    |
|   | UT-18-01            | A2-SW-DUP-MMDDYY   | surface water | Field Duplicate     | Shoreline                          |
|   |                     | A2-SED-DUP-MMDDYY  | sediment      | Field Duplicate     |                                    |
|   | UT-18-03            | UT-SW-18-03-MONYY  | surface water | MS/MSD              | Shoreline                          |
|   |                     | UT-SED-18-03-MONYY | sediment      | MS/MSD              |                                    |
|   | NB-18-03            | NB-SW-18-03-MONYY  | surface water | MS/MSD              | Shoreline<br>(south side of brook) |
|   |                     | NB-SED-18-03-MONYY | sediment      | MS/MSD              |                                    |
|   | NA                  | A2-SW-EB-MMDDYY    | NA            | Equipment Blank     | NA                                 |
|   | NA                  | A2-SED-EB-MMDDYY   | NA            | Equipment Blank     | NA                                 |
|   | NA                  | A2-SW-FRB-MMDDYY   | NA            | Field Reagent Blank | NA                                 |

Notes:

All samples will be analyzed for PFAS via isotope dilution. Analyte list is specified in UFP-QAPP Worksheet #15. Select samples will also be analyzed for Total Organic Carbon and grain size.

\* = The sample name will consist of the location, followed by the matrix code, followed by the month and the year the sample was collected. The month will be represented by three letters and the year by two numbers.

\*\*Main Channel: Samples will be collected from the main channel. Shoreline: Samples will be collected from the edge of the wetland system by accessing the shoreline by foot and wading approximately 3 feet from shore. All samples should be collected in an area that is conducive to deposition (i.e., away from areas of turbulent flow and/or wave action).

\*\*\* Field Quality Control Samples (FD, MS/MSD, EBs and Field Reagent Blanks) will be collected at a frequency specified in UFP-QAPP worksheet #20. The FD will be collected at a 10% frequency, MS/MSD will be collected at a 5% frequency, EB will be collected at least once a week per piece of equipment, the FRB will be collected at least once during the sampling event. The frequency will be applied to all of Area 2. The QC samples IDs are approximated and can change based on field conditions. Equipment blanks only collected if non-disposal equipment is used.

EB = equipment blank

FRB = field reagent blank

NA = not applicable

FD = field duplicate

MS/MSD = matrix spike/matrix spike duplicate

QC = quality control

**Table 4**  
**Area 2 Existing Monitoring Well Construction Information -**  
**AOCs 32/43A, 43G, 43J, 69W and MacPherson Water Supply Well**  
**Area 2 Field Sampling Plan**  
**Devens PFAS Remedial Investigation Workplan**

| Monitoring Well   | Well Screen Interval (ft bgs) | Well Screen Interval (ft NGVD29) | Top of Casing Elevation (ft NGVD29) | Ground Surface Elevation (ft NGVD29) | Well Screen Interval (ft NAVD88) | Top of Casing Elevation (ft NAVD88) | Ground Surface Elevation (ft NAVD88) |
|-------------------|-------------------------------|----------------------------------|-------------------------------------|--------------------------------------|----------------------------------|-------------------------------------|--------------------------------------|
| <b>AOC 32/43A</b> |                               |                                  |                                     |                                      |                                  |                                     |                                      |
| 32M-92-01X        | 13.70 - 23.70                 | 244.70 - 234.70                  | 260.93                              | 258.40                               | 243.76 - 228.76                  | 260.17                              | 258.26                               |
| 32M-92-03X        | 23.20 - 33.20                 | 235.60 - 225.60                  | 260.99                              | 258.80                               | 243.73 - 228.73                  | 260.02                              | 258.23                               |
| 32M-01-13XBR      | 13.70 - 23.70                 | 245.40 - 235.40                  | UKN                                 | 259.10                               | 244.60 - 234.60                  | 257.88                              | 258.30                               |
| 32M-01-14XBR      | 34.00 - 44.00                 | 221.10 - 211.10                  | UKN                                 | 255.10                               | 220.11 - 210.11                  | 256.06                              | 254.11                               |
| 32M-01-14XOB      | 17.30 - 27.30                 | 237.90 - 227.90                  | UKN                                 | 255.20                               | 237.00 - 227.00                  | 256.56                              | 254.30                               |
| 32M-01-15XBR      | 34.50 - 44.50                 | 224.21 - 214.21                  | 258.36                              | 258.71                               | 223.53 - 213.53                  | 257.70                              | 258.03                               |
| 32M-01-16XBR      | 21.00 - 31.00                 | 237.50 - 227.50                  | UKN                                 | 258.50                               | 236.70 - 226.70                  | 257.50                              | 257.70                               |
| 32M-01-17XBR      | 41.40 - 51.40                 | 215.70 - 205.70                  | UKN                                 | 257.10                               | 215.45 - 205.45                  | 259.11                              | 256.85                               |
| 32M-01-18XBR      | 14.00 - 24.00                 | 245.40 - 235.40                  | UKN                                 | 259.40                               | 244.61 - 234.61                  | 258.32                              | 258.61                               |
| 32Z-99-02X        | 14.50 - 29.50                 | 243.90 - 228.90                  | 260.79                              | 258.40                               | 242.98 - 227.98                  | 259.71                              | 257.48                               |
| 32Z-01-04XBR      | 25.00 - 35.00                 | 236.50 - 226.50                  | UKN                                 | 261.50                               | UKN                              | UKN                                 | UKN                                  |
| 32Z-01-05XOB      | 25.50 - 35.50                 | 236.30 - 226.30                  | UKN                                 | 261.80                               | UKN                              | UKN                                 | UKN                                  |
| 32Z-01-06XBR      | 16.70 - 26.70                 | 244.10 - 234.10                  | UKN                                 | 260.80                               | 243.12 - 233.12                  | 261.85                              | 259.82                               |
| 32Z-01-07XOB      | 12.70 - 22.70                 | 245.30 - 235.30                  | UKN                                 | 258.00                               | 244.98 - 234.98                  | 259.48                              | 257.68                               |
| 32Z-01-08XOB      | 12.00 - 22.00                 | 246.80 - 236.80                  | UKN                                 | 258.80                               | 246.59 - 236.59                  | 260.49                              | 258.59                               |
| 32Z-01-09XOB      | 23.50 - 33.50                 | 235.10 - 225.10                  | UKN                                 | 258.60                               | UKN                              | UKN                                 | UKN                                  |
| 32Z-01-10XBR      | 12.50 - 22.50                 | 246.10 - 236.10                  | UKN                                 | 258.60                               | 245.26 - 235.26                  | 257.41                              | 257.76                               |
| 32Z-01-11XBR      | 9.00 - 19.00                  | 253.80 - 243.80                  | UKN                                 | 262.80                               | 253.07 - 243.07                  | 261.50                              | 262.07                               |
| 32Z-01-12XBR      | 28.20 - 38.20                 | 230.90 - 220.90                  | UKN                                 | 259.10                               | 230.04 - 220.04                  | 257.85                              | 258.24                               |
| 43M-01-20XOB      | 24.00 - 34.00                 | 232.96 - 222.96                  | UKN                                 | 258.70                               | 233.78 - 223.78                  | 257.40                              | 257.78                               |
| 43M-01-20XBR      | 68.30 - 78.30                 | 190.40 - 180.40                  | UKN                                 | 258.70                               | 189.48 - 179.48                  | 257.30                              | 257.78                               |

**Table 4**  
**Area 2 Existing Monitoring Well Construction Information -**  
**AOCs 32/43A, 43G, 43J, 69W and MacPherson Water Supply Well**  
**Area 2 Field Sampling Plan**  
**Devens PFAS Remedial Investigation Workplan**

| Monitoring Well | Well Screen Interval (ft bgs) | Well Screen Interval (ft NGVD29) | Top of Casing Elevation (ft NGVD29) | Ground Surface Elevation (ft NGVD29) | Well Screen Interval (ft NAVD88) | Top of Casing Elevation (ft NAVD88) | Ground Surface Elevation (ft NAVD88) |
|-----------------|-------------------------------|----------------------------------|-------------------------------------|--------------------------------------|----------------------------------|-------------------------------------|--------------------------------------|
| 43M-01-17XOB    | 23.50 - 33.50                 | 235.90 - 225.90                  | UKN                                 | 259.40                               | 235.01 - 225.01                  | 258.08                              | 258.51                               |
| 43M-01-17XBR    | 47.50 - 57.50                 | 211.80 - 201.80                  | UKN                                 | 259.30                               | 211.03 - 201.03                  | 258.29                              | 258.53                               |
| 43M-01-16XOB    | 24.00 - 34.00                 | 233.90 - 223.90                  | UKN                                 | 257.90                               | 233.11 - 223.11                  | 256.88                              | 257.11                               |
| 43M-01-16XBR    | 47.50 - 57.50                 | 210.30 - 200.30                  | UNK                                 | 257.80                               | 209.54 - 199.54                  | 256.84                              | 257.04                               |
| SHL-12          | 15.0 - 30.0                   | 233.62 - 218.62                  | 248.62                              | UKN                                  | 232.22 - 217.22                  | 248.62                              | 247.22                               |
| SHL-15          | 14.5 - 24.5                   | UKN                              | UKN                                 | UKN                                  | 244.52 - 234.52                  | 259.92                              | 259.02                               |
| SHL-16          | UKN                           | UKN                              | UKN                                 | UKN                                  | UKN                              | UKN                                 | UKN                                  |
| SHL-17          | 6.0 - 16.0                    | 226.77 - 216.77                  | UKN                                 | 232.77                               | 225.88 - 215.88                  | 233.79                              | 231.88                               |
| SHL-25          | 23.5 - 33.5                   | 233.60 - 223.60                  | UKN                                 | 257.10                               | 232.78 - 222.78                  | 258.01                              | 256.28                               |
| <b>AOC-43G</b>  |                               |                                  |                                     |                                      |                                  |                                     |                                      |
| AAFES-2         | 16.20 - 31.20                 | 284.07 - 269.07                  | 302.52                              | 300.27                               | UKN                              | UKN                                 | UKN                                  |
| AAFES-5         | 15.50 - 30.50                 | 285.31 - 270.31                  | 300.60                              | 300.81                               | UKN                              | UKN                                 | UKN                                  |
| AAFES-6R        | 15.00 - 25.00                 | UKN                              | UKN                                 | UKN                                  | UKN                              | UKN                                 | UKN                                  |
| AAFES-7         | 4.50 - 14.50                  | 251.61 - 241.61                  | 258.57                              | 256.11                               | UKN                              | UKN                                 | UKN                                  |
| XGM-93-01X      | 23.00 - 33.00                 | 288.55 - 278.55                  | 313.62                              | 311.55                               | UKN                              | UKN                                 | UKN                                  |
| XGM-93-02X      | 28.00 - 38.00                 | 282.20 - 272.20                  | 309.81                              | 310.20                               | UKN                              | UKN                                 | UKN                                  |
| XGM-94-04X      | 18.15 - 28.15                 | 280.95 - 270.95                  | 301.49                              | 299.10                               | UKN                              | UKN                                 | UKN                                  |
| XGM-94-06X      | 17.00 - 27.00                 | 265.20 - 255.20                  | 284.87                              | 282.20                               | UKN                              | UKN                                 | UKN                                  |
| XGM-94-07X      | 17.00 - 27.00                 | 276.00 - 266.00                  | 295.62                              | 293.00                               | UKN                              | UKN                                 | UKN                                  |
| XGM-94-08X      | 23.50 - 33.50                 | 273.70 - 263.70                  | 299.78                              | 297.20                               | UKN                              | UKN                                 | UKN                                  |
| XGM-94-09X      | 23.00 - 33.00                 | 285.40 - 275.40                  | 310.73                              | 308.40                               | UKN                              | UKN                                 | UKN                                  |
| XGM-94-10X      | 21.50 - 31.50                 | 278.90 - 268.90                  | 302.76                              | 300.40                               | UKN                              | UKN                                 | UKN                                  |

**Table 4**  
**Area 2 Existing Monitoring Well Construction Information -**  
**AOCs 32/43A, 43G, 43J, 69W and MacPherson Water Supply Well**  
**Area 2 Field Sampling Plan**  
**Devens PFAS Remedial Investigation Workplan**

| <b>Monitoring Well</b> | <b>Well Screen Interval (ft bgs)</b> | <b>Well Screen Interval (ft NGVD29)</b> | <b>Top of Casing Elevation (ft NGVD29)</b> | <b>Ground Surface Elevation (ft NGVD29)</b> | <b>Well Screen Interval (ft NAVD88)</b> | <b>Top of Casing Elevation (ft NAVD88)</b> | <b>Ground Surface Elevation (ft NAVD88)</b> |
|------------------------|--------------------------------------|---|--|---|---|--|---|
| XGM-97-12X             | 24.00 - 34.00                        | 286.06 - 282.06                         | 309.63                                     | 310.06                                      | UNK                                     | UNK  | UNK   |
| <b>AOC-43J</b>         |                                      |   |  |   |   |  |   |
| 2446-02                | 5-15                                 | 364.00 - 354.00                         | 368.90                                     | 369.00                                      | UNK                                     | UNK  | UNK   |
| 2446-03                | 8-18                                 | 361.50 - 351.50                         | 369.20                                     | 369.50                                      | UNK                                     | UNK  | UNK   |
| 2446-04                | 10 -20                               | 359.60 - 349.60                         | 369.40                                     | 369.60                                      | UNK                                     | UNK  | UNK   |
| HA-1B                  | UNK                                  | UNK                                     | 371.50                                     | 366.30                                      | UNK                                     | UNK  | UNK   |
| HA-1S                  | UNK                                  | UNK                                     | 371.40                                     | 366.40                                      | UNK                                     | UNK  | UNK   |
| HA-2B                  | UNK                                  | UNK                                     | 366.10                                     | 366.40                                      | UNK                                     | UNK  | UNK   |
| HA-2S                  | UNK                                  | UNK                                     | 366.00                                     | 366.20                                      | UNK                                     | UNK  | UNK   |
| HA-3B                  | UNK                                  | UNK                                     | 363.70                                     | 364.00                                      | UNK                                     | UNK  | UNK   |
| HA-3S                  | UNK                                  | UNK                                     | 363.60                                     | 363.80                                      | UNK                                     | UNK  | UNK   |
| HA-4B                  | UNK                                  | UNK                                     | 366.10                                     | 366.40                                      | UNK                                     | UNK  | UNK   |
| HA-4S                  | UNK                                  | UNK                                     | 366.30                                     | 366.60                                      | UNK                                     | UNK  | UNK   |
| HA-5S                  | UNK                                  | UNK                                     | 368.80                                     | UNK   | UNK                                     | UNK  | UNK   |
| HA-6B                  | UNK                                  | UNK                                     | 368.90                                     | UNK   | UNK                                     | UNK  | UNK   |
| XJM-93-01X             | 6.50 -16.5                           | 362.70 - 352.70                         | 371.40                                     | 369.20                                      | UNK                                     | UNK  | UNK   |
| XJM-93-02X             | 5.9-15.9                             | 365.20 - 355.20                         | 370.60                                     | 371.10                                      | UNK                                     | UNK  | UNK   |
| XJM-93-03X             | 6.6-16.6                             | 362.00 - 352.00                         | 368.00                                     | 368.50                                      | UNK                                     | UNK  | UNK   |
| XJM-93-04X             | 4.5-14.5                             | 364.20 - 354.20                         | 371.20                                     | 368.70                                      | UNK                                     | UNK  | UNK   |
| XJM-94-05X             | 6.1-16.1                             | 362.80 - 352.80                         | 368.50                                     | 368.90                                      | UNK                                     | UNK  | UNK   |
| XJM-94-06X             | 6.7 - 16.7                           | 361.20 - 351.20                         | 367.40                                     | 367.90                                      | UNK                                     | UNK  | UNK   |
| XJM-94-07X             | 3.7-13.7                             | 358.50 - 348.50                         | 365.00                                     | 362.20                                      | UNK                                     | UNK  | UNK   |

**Table 4**  
**Area 2 Existing Monitoring Well Construction Information -**  
**AOCs 32/43A, 43G, 43J, 69W and MacPherson Water Supply Well**  
**Area 2 Field Sampling Plan**  
**Devens PFAS Remedial Investigation Workplan**

| Monitoring Well | Well Screen Interval (ft bgs) | Well Screen Interval (ft NGVD29) | Top of Casing Elevation (ft NGVD29) | Ground Surface Elevation (ft NGVD29) | Well Screen Interval (ft NAVD88) | Top of Casing Elevation (ft NAVD88) | Ground Surface Elevation (ft NAVD88) |
|-----------------|-------------------------------|----------------------------------|-------------------------------------|--------------------------------------|----------------------------------|-------------------------------------|--------------------------------------|
| XJM-94-08X      | 7.6-17.6                      | 359.10 - 349.10                  | 369.30                              | 366.70                               | UNK                              | UNK                                 | UNK                                  |
| XJM-94-09X      | 8.7-17.7                      | 360.30 - 350.30                  | 371.60                              | 369.00                               | UNK                              | UNK                                 | UNK                                  |
| XJM-94-10X      | 7.8-17.8                      | 361.20 - 351.20                  | 371.40                              | 369.00                               | UNK                              | UNK                                 | UNK                                  |
| XJM-97-11X      | 25.5-35.5                     | 343.80 - 233.80                  | 371.50                              | 369.30                               | UNK                              | UNK                                 | UNK                                  |
| XJM-97-12X      | 20.0 - 30.0                   | 348.80 - 338.80                  | 368.40                              | 368.80                               | UNK                              | UNK                                 | UNK                                  |
| XJM-97-13X      | 41.5-51.5                     | 325.10 - 315.10                  | 369.30                              | 366.60                               | UNK                              | UNK                                 | UNK                                  |
| INJ-01          | UNK                           | UNK                              | 368.10                              | UNK                                  | UNK                              | UNK                                 | UNK                                  |
| INJ-02          | UNK                           | UNK                              | 369.00                              | UNK                                  | UNK                              | UNK                                 | UNK                                  |
| <b>AOC 69W</b>  |                               |                                  |                                     |                                      |                                  |                                     |                                      |
| 69W-94-12       | 3.00 - 13.00                  | 223.45 - 213.45                  | 228.94                              | 226.45                               | UKN                              | UKN                                 | UKN                                  |
| 69W-94-13       | 3.00 - 13.00                  | 221.30 - 212.30                  | 227.79                              | 225.30                               | UKN                              | UKN                                 | UKN                                  |
| 69W-94-14       | 3.00 - 13.00                  | 222.53 - 212.53                  | 228.02                              | 225.53                               | UKN                              | UKN                                 | UKN                                  |
| ZWM-95-15X      | 3.0 - 13.00                   | 219.94 - 209.94                  | 225.81                              | 222.94                               | UKN                              | UKN                                 | UKN                                  |
| ZWM-95-18X      | 3.0 - 13.00                   | 217.73 - 207.73                  | 222.95                              | 220.73                               | UKN                              | UKN                                 | UKN                                  |
| ZWM-99-22X      | 4.63 - 14.63                  | 223.06 - 213.06                  | 227.52                              | 227.69                               | UKN                              | UKN                                 | UKN                                  |
| ZWM-99-23X      | 3.0 - 13.00                   | 221.20 - 211.20                  | 225.88                              | 224.20                               | UKN                              | UKN                                 | UKN                                  |
| ZWM-99-24X      | 2.50 - 12.50                  | 221.13 - 211.13                  | 226.65                              | 223.63                               | UKN                              | UKN                                 | UKN                                  |
| ZWM-01-25X      | 4.00 - 14.00                  | 219.38 - 209.38                  | 225.51                              | 223.38                               | UKN                              | UKN                                 | UKN                                  |
| ZWM-95-17X      | 12.20 - 22.20                 | 223.87 - 213.87                  | 238.63                              | 236.07                               | UKN                              | UKN                                 | UKN                                  |
| ZWM-01-26X      | 4.00 - 14.00                  | 221.16 - 211.16                  | 227.61                              | 225.16                               | UKN                              | UKN                                 | UKN                                  |
| ZWP-95-01X      | 10.00 - 12.00                 | 214.43 - 212.43                  | 226.84                              | 224.43                               | UKN                              | UKN                                 | UKN                                  |
| ZWP-95-02X      | 9.50 - 11.50                  | 211.21 - 209.21                  | 223.63                              | 220.71                               | UKN                              | UKN                                 | UKN                                  |

**Table 4**  
**Area 2 Existing Monitoring Well Construction Information -**  
**AOCs 32/43A, 43G, 43J, 69W and MacPherson Water Supply Well**  
**Area 2 Field Sampling Plan**  
**Devens PFAS Remedial Investigation Workplan**

| <b>Monitoring Well</b>        | <b>Well Screen Interval (ft bgs)</b> | <b>Well Screen Interval (ft NGVD29)</b> | <b>Top of Casing Elevation (ft NGVD29)</b> | <b>Ground Surface Elevation (ft NGVD29)</b> | <b>Well Screen Interval (ft NAVD88)</b> | <b>Top of Casing Elevation (ft NAVD88)</b> | <b>Ground Surface Elevation (ft NAVD88)</b> |
|-------------------------------|--------------------------------------|---|--|---|---|--|---|
| ZWM-95-16X                    | 6.30 - 16.30                         | 222.71 - 212.71                         | 228.38                                     | 229.01                                      | UKN                                     | UKN  | UKN   |
| ZWM-96-19X                    | 5.80 - 15.80                         | 225.73 - 215.73                         | 231.11                                     | 231.53                                      | UKN                                     | UKN  | UKN   |
| ZWM-96-20X                    | 2.80 - 12.80                         | 223.69 - 213.69                         | 225.99                                     | 226.49                                      | UKN                                     | UKN  | UKN   |
| ZWM-96-21X                    | 4.80 - 14.80                         | 226.37 - 216.37                         | 230.93                                     | 231.17                                      | UKN                                     | UKN  | UKN   |
| 69WP-08-01                    | 10.00 - 13.00                        | 211.50 - 208.50                         | UKN  | UKN   | UKN                                     | UKN  | UKN   |
| 69WP-13-01                    | 10.02 - 13.02                        | 211.50 - 208.50                         | 221.50                                     | UKN   | UKN                                     | UKN  | UKN   |
| <b>MacPherson Supply Well</b> | 72-93                                |   | 215.42                                     | 211.7                                       |   |  |   |
| MPP-93-01                     | UKN                                  | UKN                                     | 215.28                                     | 212.7                                       | UKN                                     | UKN  | UKN   |
| MPP-93-02                     | UKN                                  | UKN                                     | 213.6                                      | 211.8                                       | UKN                                     | UKN  | UKN   |
| MPP-93-03                     | UKN                                  | UKN                                     | 215.09                                     | 211.9                                       | UKN                                     | UKN  | UKN   |

Notes:

AOC = Area of Concern

bgs = below ground surface

ft = feet

NGVD29 = National Geodetic Vertical Datum 29, Sources are various historical reports.

NAVD88 = Vertical Datum 88, Source is Shepley's Hill Landfill, Devens, Massachusetts Monitoring Well Survey, WSP, November 2017 and January 2018.

PFAS = per- and polyfluoroalkyl substances

UKN = unknown

Wells designated to be sampled in RI

**Table 5**  
**Area 2 Groundwater Vertical Profiling Locations and Rationale**  
**Area 2 Field Sampling Plan**  
**Devens PFAS Remedial Investigation Workplan**

| Proposed Location             | Rationale   |
|-------------------------------|---|
| <b>Area of Concern 32/43A</b> |   |
| 32VP-18-01                    | Determine if PFAS contamination is present in groundwater to the north of the Recycling Center, upgradient of the detention pond.                     |
| 32VP-18-02                    | Determine if PFAS contamination is present in groundwater to the north of the Recycling Center.   |
| 32VP-18-03                    | Determine if PFAS contamination is present in groundwater to the south of the Recycling Center.   |
| 32VP-18-04                    | Determine the extent of PFAS contamination in groundwater downgradient of AOC 32.   |
| 32VP-18-05                    | Determine the extent of PFAS contamination in groundwater downgradient of AOC 32.   |
| 32VP-18-06                    | Determine the extent of PFAS contamination in groundwater downgradient of AOC 32.   |
| 43AVP-18-01                   | Determine the extent of PFAS detections in groundwater downgradient of AOC 43A.   |
| 43AVP-18-02                   | Determine the extent of PFAS detections in groundwater downgradient of AOC 43A.   |
| 43AVP-18-03                   | Determine the extent of PFAS detections in groundwater downgradient of AOC 43A.   |
| <b>Area of Concern 43G</b>    |   |
| 43GVP-18-01                   | Determine the extent of PFAS contamination in groundwater crossgradient to the south of known PFAS contamination at XGM-94-06X.                       |
| 43GVP-18-02                   | Determine the extent of PFAS contamination in groundwater crossgradient to the north of known PFAS contamination at XGM-94-06X.                       |
| 43GVP-18-03                   | Determine if PFAS contamination is present in groundwater upgradient of known PFAS contamination.   |
| 43GVP-18-04                   | Determine extent of PFAS contamination in groundwater in area of known PFAS contamination.  |
| 43GVP-18-05                   | Determine extent of PFAS contamination in groundwater in area of known PFAS contamination.  |
| 43GVP-18-06                   | Determine the extent of PFAS contamination in groundwater downgradient and crossgradient to the north of known PFAS contamination at AAFES-7.         |
| 43GVP-18-07                   | Determine the extent of PFAS contamination in groundwater downgradient of known PFAS contamination at AAFES-7.  |
| 43GVP-18-08                   | Determine the extent of PFAS contamination in groundwater downgradient and crossgradient to the south of known PFAS contamination at AAFES-7.         |
| <b>Area of Concern 76</b>     |   |
| 76VP-18-01*                   | Define the extent of PFAS contamination in groundwater upgradient of AOC 76.  |
| 76VP-18-02*                   | Define the extent of PFAS contamination in groundwater upgradient of AOC 76.  |
| 76VP-18-03*                   | Define the extent of PFAS contamination in groundwater upgradient of AOC 76.  |
| 76VP-18-04*                   | Define the extent of PFAS contamination in groundwater cross-gradient (northwest) of known PFAS contamination.  |
| 76SB-18-05/<br>76VP-18-05*    | Define the extent of PFAS contamination in soil and groundwater at the dumpster fire area.  |
| 76SB-18-06 /<br>76VP-18-06*   | Define the extent of PFAS contamination in groundwater and soil at edge of former pavement.   |
| 76VP-18-07*                   | Define the extent of PFAS contamination in groundwater cross-gradient (northwest) of known PFAS contamination.  |
| 76SB-18-08 /<br>76VP-18-08*   | Define the extent of PFAS contamination in groundwater and soil within area of known groundwater contamination (detention pond).                      |
| 76VP-18-09*                   | Define the downgradient extent of PFAS contamination in groundwater cross-gradient of an area of known PFAS contamination, upgradient to Willow Brook |
| 76VP-18-10                    | Define the downgradient extent of PFAS contamination in groundwater downgradient of an area of known PFAS contamination, upgradient to Willow Brook.  |



**Table 5**  
**Area 2 Groundwater Vertical Profiling Locations and Rationale**  
**Area 2 Field Sampling Plan**  
**Devens PFAS Remedial Investigation Workplan**

| Proposed Location                                      | Rationale   |
|--|---|
| 76VP-18-11*  | Define the downgradient extent of PFAS contamination in groundwater downgradient of an area of known PFAS contamination, upgradient to Willow Brook.  |
| 76VP-18-12   | Define the extent of PFAS contamination in groundwater downgradient of known PFAS contamination and investigate migration of PFAS contamination beneath Willow Brook.   |
| 76VP-18-13*  | Define the downgradient extent of PFAS contamination in groundwater downgradient of an area of known PFAS contamination, upgradient to Willow Brook.  |
| 76VP-18-14   | Define the downgradient extent of PFAS contamination in groundwater downgradient of an area of known PFAS contamination, upgradient to Willow Brook.  |
| 76VP-18-15*  | Define the downgradient extent of PFAS contamination in groundwater downgradient of an area of known PFAS contamination, upgradient to Willow Brook.  |
| 76VP-18-16   | Define the extent of PFAS contamination in groundwater downgradient of known PFAS contamination and investigate migration of PFAS contamination beneath Willow Brook.   |
| 76SB-18-01   | Determine if PFAS in soil within limits of detention pond.  |
| 76SB-18-02   | Delineate the extent of PFAS contamination in soil at dumpster fire area.   |
| 76SB-18-03   | Determine if PFAS in soil within limits of detention pond.  |
| 76SB-18-04   | Determine if PFAS in soil within limits of detention pond.  |
| 76SB-18-07   | Delineate the extent of PFAS contamination in soil at edge of pavement near training area.  |
| 76SB-18-09   | Delineate the extent of PFAS contamination in soil at edge of pavement near training area.  |
| 76SB-18-10   | Delineate the extent of PFAS contamination in soil in Former AFFF Storage Area.   |
| 76SB-18-11   | Delineate the extent of PFAS contamination in soil at edge of pavement near training area.  |
| 76SB-18-12   | Delineate the extent of PFAS contamination in soil at edge of pavement near training area.  |
| 76SB-18-13   | Delineate the extent of PFAS contamination in soil at edge of pavement near training area.  |
| <b>MacPherson Municipal Well</b>                       |   |
| MPVP-18-01   | Determine if PFAS is present in groundwater to the west of MacPherson Well.   |
| MPVP-18-02   | Determine if PFAS is present in groundwater to the southwest of MacPherson Well.  |
| MPVP-18-03   | Determine if PFAS is present in groundwater to the south of MacPherson Well.  |
| MPVP-18-04   | Determine if PFAS is present in groundwater to the southeast of MacPherson Well.  |
| MPVP-18-05   | Determine if PFAS is present in groundwater to the east of MacPherson Well.   |
| MPVP-18-06   | Determine if PFAS is present in groundwater to the northeast of MacPherson Well.  |
| MPVP-18-07   | Determine if PFAS is present in groundwater to the north of MacPherson Well.  |
| MPVP-18-08   | Determine if PFAS is present in groundwater to the northeast of MacPherson Well, across Nonacoicus Brook.   |
| 6 Contingency Profiles to the south of MacPherson Well | If PFAS detected in initial vertical profiles located south of MacPherson Well. Establish a transect downgradient (to the south) along West Main Street to further define the vertical and lateral extent of PFAS in groundwater that is migrating toward MacPherson well from the south (from Devens). |

AOC = Area of Concern

PFAS = per- and poly-fluoroalkyl substances

Notes:

1. Evaluation of need for any groundwater vertical profiling locations will be based on a review of PFAS data from the existing monitoring well network at this AOC.

\* Location where a piezometer will be installed at the water table after groundwater vertical profiling to provide depth to water measurements and determine groundwater flow direction at AOC 76.

**Table 6**  
**Area 2 Groundwater Vertical Profiling Sampling Summary**  
**Area 2 Field Sampling Plan**  
**Devens PFAS Remedial Investigation Workplan**

| Area       | Location Identifier | Sample Name**     | Maximum Target Depth (ft bgs) * | Ground Surface Elevation (ft MSL) | WT Elevation (ft MSL) from nearby wells in SI or Temporary wells | Approximate Depth to Groundwater (ft bgs)** | Proposed Sample Depth (ft bgs)** | Sample Type*** |
|------------|---------------------|-------------------|---------------------------------|-----------------------------------|--|---|----------------------------------|----------------|
| AOC 32/43A | 32VP-18-01          | 32VP-18-01-XX-XX  | 50                              | 260                               | 235  | 25  | 25-29                            | Native Sample  |
|            |                     | 32VP-18-01-XX-XX  | 50                              | 260                               | 235  | 25  | 35-39                            | Native Sample  |
|            |                     | 32VP-18-01-XX-XX  | 50                              | 260                               | 235  | 25  | 45-49                            | Native Sample  |
|            | 32VP-18-02          | 32VP-18-02-XX-XX  | 50                              | 260                               | 235  | 25  | 25-29                            | Native Sample  |
|            |                     | 32VP-18-02-XX-XX  | 50                              | 260                               | 235  | 25  | 35-39                            | Native Sample  |
|            |                     | 32VP-18-02-XX-XX  | 50                              | 260                               | 235  | 25  | 45-49                            | Native Sample  |
|            | 32VP-18-03          | 32VP-18-03-XX-XX  | 50                              | 260                               | 235  | 25  | 25-29                            | Native Sample  |
|            |                     | 32VP-18-03-XX-XX  | 50                              | 260                               | 235  | 25  | 35-39                            | Native Sample  |
|            |                     | 32VP-18-03-XX-XX  | 50                              | 260                               | 235  | 25  | 45-49                            | Native Sample  |
|            | 32VP-18-04          | 32VP-18-04-XX-XX  | 50                              | 240                               | 215  | 25  | 25-29                            | Native Sample  |
|            |                     | 32VP-18-04-XX-XX  | 50                              | 240                               | 215  | 25  | 35-39                            | Native Sample  |
|            |                     | 32VP-18-04-XX-XX  | 50                              | 240                               | 215  | 25  | 45-49                            | Native Sample  |
|            | 32VP-18-05          | 32VP-18-05-XX-XX  | 50                              | 240                               | 215  | 25  | 25-29                            | Native Sample  |
|            |                     | 32VP-18-05-XX-XX  | 50                              | 240                               | 215  | 25  | 35-39                            | Native Sample  |
|            |                     | 32VP-18-05-XX-XX  | 50                              | 240                               | 215  | 25  | 45-49                            | Native Sample  |
|            | 32VP-18-06          | 32VP-18-06-XX-XX  | 50                              | 240                               | 215  | 25  | 25-29                            | Native Sample  |
|            |                     | 32VP-18-06-XX-XX  | 50                              | 240                               | 215  | 25  | 35-39                            | Native Sample  |
|            |                     | 32VP-18-06-XX-XX  | 50                              | 240                               | 215  | 25  | 45-49                            | Native Sample  |
|            | 43AVP-18-01         | 43AVP-18-01-XX-XX | 50                              | 260                               | 250  | 10  | 10-14                            | Native Sample  |
|            |                     | 43AVP-18-01-XX-XX | 50                              | 260                               | 250  | 10  | 20-24                            | Native Sample  |
|            |                     | 43AVP-18-01-XX-XX | 50                              | 260                               | 250  | 10  | 30-34                            | Native Sample  |
|            |                     | 43AVP-18-01-XX-XX | 50                              | 260                               | 250  | 10  | 40-44                            | Native Sample  |
|            | 43AVP-18-02         | 43AVP-18-02-XX-XX | 50                              | 260                               | 250  | 10  | 10-14                            | Native Sample  |
|            |                     | 43AVP-18-02-XX-XX | 50                              | 260                               | 250  | 10  | 20-24                            | Native Sample  |
|            |                     | 43AVP-18-02-XX-XX | 50                              | 260                               | 250  | 10  | 30-34                            | Native Sample  |
|            |                     | 43AVP-18-02-XX-XX | 50                              | 260                               | 250  | 10  | 40-44                            | Native Sample  |
|            | 43AVP-18-03         | 43AVP-18-03-XX-XX | 50                              | 260                               | 250  | 10  | 10-14                            | Native Sample  |
|            |                     | 43AVP-18-03-XX-XX | 50                              | 260                               | 250  | 10  | 20-24                            | Native Sample  |
|            |                     | 43AVP-18-03-XX-XX | 50                              | 260                               | 250  | 10  | 30-34                            | Native Sample  |
|            |                     | 43AVP-18-03-XX-XX | 50                              | 260                               | 250  | 10  | 40-44                            | Native Sample  |
| AOC-43G    | 43GVP-18-01         | 43GVP-18-01-XX-XX | 30                              | 259                               | 248  | 11  | 10-14                            | Native Sample  |
|            |                     | 43GVP-18-01-XX-XX | 30                              | 259                               | 248  | 11  | 20-24                            | Native Sample  |
|            |                     | 43GVP-18-01-XX-XX | 30                              | 259                               | 248  | 11  | 30-34                            | Native Sample  |

**Table 6**  
**Area 2 Groundwater Vertical Profiling Sampling Summary**  
**Area 2 Field Sampling Plan**  
**Devens PFAS Remedial Investigation Workplan**

| Area    | Location Identifier | Sample Name**     | Maximum Target Depth (ft bgs) * | Ground Surface Elevation (ft MSL) | WT Elevation (ft MSL) from nearby wells in SI or Temporary wells | Approximate Depth to Groundwater (ft bgs)** | Proposed Sample Depth (ft bgs)** | Sample Type*** |
|---------|---------------------|-------------------|---------------------------------|-----------------------------------|--|---|----------------------------------|----------------|
| AOC-43G | 43GVP-18-02         | 43GVP-18-01-XX-XX | 30                              | 259                               | 248  | 11  | 10-14                            | Native Sample  |
|         |                     | 43GVP-18-01-XX-XX | 30                              | 259                               | 248  | 11  | 20-24                            | Native Sample  |
|         |                     | 43GVP-18-01-XX-XX | 30                              | 259                               | 248  | 11  | 30-34                            | Native Sample  |
|         | 43GVP-18-03         | 43GVP-18-03-XX-XX | 50                              | 302                               | 277  | 25  | 25-29                            | Native Sample  |
|         |                     | 43GVP-18-03-XX-XX | 50                              | 302                               | 277  | 25  | 35-39                            | Native Sample  |
|         |                     | 43GVP-18-03-XX-XX | 50                              | 302                               | 277  | 25  | 45-49                            | Native Sample  |
|         | 43GVP-18-04         | 43GVP-18-04-XX-XX | 50                              | 259                               | 248  | 11  | 10-14                            | Native Sample  |
|         |                     | 43GVP-18-04-XX-XX | 50                              | 259                               | 248  | 11  | 20-24                            | Native Sample  |
|         |                     | 43GVP-18-04-XX-XX | 50                              | 259                               | 248  | 11  | 30-34                            | Native Sample  |
|         |                     | 43GVP-18-04-XX-XX | 50                              | 259                               | 248  | 11  | 40-44                            | Native Sample  |
|         | 43GVP-18-05         | 43GVP-18-05-XX-XX | 40                              | 259                               | 248  | 11  | 10-14                            | Native Sample  |
|         |                     | 43GVP-18-05-XX-XX | 40                              | 259                               | 248  | 11  | 20-24                            | Native Sample  |
|         |                     | 43GVP-18-05-XX-XX | 40                              | 259                               | 248  | 11  | 30-34                            | Native Sample  |
|         |                     | 43GVP-18-05-XX-XX | 40                              | 259                               | 248  | 11  | 40-44                            | Native Sample  |
|         | 43GVP-18-06         | 43GVP-18-06-XX-XX | 50                              | 302                               | 277  | 25  | 25-29                            | Native Sample  |
|         |                     | 43GVP-18-06-XX-XX | 50                              | 302                               | 277  | 25  | 35-39                            | Native Sample  |
|         |                     | 43GVP-18-06-XX-XX | 50                              | 302                               | 277  | 25  | 45-49                            | Native Sample  |
|         | 43GVP-18-07         | 43GVP-18-07-XX-XX | 50                              | 259                               | 248  | 11  | 10-14                            | Native Sample  |
|         |                     | 43GVP-18-07-XX-XX | 50                              | 259                               | 248  | 11  | 20-24                            | Native Sample  |
|         |                     | 43GVP-18-07-XX-XX | 50                              | 259                               | 248  | 11  | 30-34                            | Native Sample  |
|         |                     | 43GVP-18-07-XX-XX | 50                              | 259                               | 248  | 11  | 40-44                            | Native Sample  |
|         | 43GVP-18-08         | 43GVP-18-08-XX-XX | 50                              | 259                               | 248  | 11  | 10-14                            | Native Sample  |
|         |                     | 43GVP-18-08-XX-XX | 50                              | 259                               | 248  | 11  | 20-24                            | Native Sample  |
|         |                     | 43GVP-18-08-XX-XX | 50                              | 259                               | 248  | 11  | 30-34                            | Native Sample  |
|         |                     | 43GVP-18-08-XX-XX | 50                              | 259                               | 248  | 11  | 40-44                            | Native Sample  |
| AOC-76  | 76VP-18-01          | 76VP-18-01-XX-XX  | 50                              | 267                               | 240  | 27  | 27-31                            | Native Sample  |
|         |                     | 76VP-18-01-XX-XX  | 50                              | 267                               | 240  | 27  | 37-41                            | Native Sample  |
|         |                     | 76VP-18-01-XX-XX  | 50                              | 267                               | 240  | 27  | 47-51                            | Native Sample  |
|         | 76VP-18-02          | 76VP-18-02-XX-XX  | 50                              | 267                               | 240  | 27  | 27-31                            | Native Sample  |
|         |                     | 76VP-18-02-XX-XX  | 50                              | 267                               | 240  | 27  | 37-41                            | Native Sample  |
|         |                     | 76VP-18-02-XX-XX  | 50                              | 267                               | 240  | 27  | 47-51                            | Native Sample  |

**Table 6**  
**Area 2 Groundwater Vertical Profiling Sampling Summary**  
**Area 2 Field Sampling Plan**  
**Devens PFAS Remedial Investigation Workplan**

| Area   | Location Identifier | Sample Name**    | Maximum Target Depth (ft bgs) * | Ground Surface Elevation (ft MSL) | WT Elevation (ft MSL) from nearby wells in SI or Temporary wells | Approximate Depth to Groundwater (ft bgs)** | Proposed Sample Depth (ft bgs)** | Sample Type*** |
|--------|---------------------|------------------|---------------------------------|-----------------------------------|--|---|----------------------------------|----------------|
| AOC-76 | 76VP-18-03          | 76VP-18-03-XX-XX | 50                              | 267                               | 240  | 27  | 27-31                            | Native Sample  |
|        |                     | 76VP-18-03-XX-XX | 50                              | 267                               | 240  | 27  | 37-41                            | Native Sample  |
|        |                     | 76VP-18-03-XX-XX | 50                              | 267                               | 240  | 27  | 47-51                            | Native Sample  |
|        | 76VP-18-04          | 76VP-18-04-XX-XX | 50                              | 267                               | 247  | 20  | 20-24                            | Native Sample  |
|        |                     | 76VP-18-04-XX-XX | 50                              | 267                               | 247  | 20  | 30-34                            | Native Sample  |
|        |                     | 76VP-18-04-XX-XX | 50                              | 267                               | 247  | 20  | 40-44                            | Native Sample  |
|        |                     | 76VP-18-04-XX-XX | 50                              | 267                               | 247  | 20  | 50-54                            | Native Sample  |
|        | 76VP-18-05          | 76VP-18-05-XX-XX | 50                              | 267                               | 247  | 20  | 20-24                            | Native Sample  |
|        |                     | 76VP-18-05-XX-XX | 50                              | 267                               | 247  | 20  | 30-34                            | Native Sample  |
|        |                     | 76VP-18-05-XX-XX | 50                              | 267                               | 247  | 20  | 40-44                            | Native Sample  |
|        |                     | 76VP-18-05-XX-XX | 50                              | 267                               | 247  | 20  | 50-54                            | Native Sample  |
|        | 76VP-18-06          | 76VP-18-06-XX-XX | 50                              | 255                               | 240  | 15  | 15-19                            | Native Sample  |
|        |                     | 76VP-18-06-XX-XX | 50                              | 255                               | 240  | 15  | 25-29                            | Native Sample  |
|        |                     | 76VP-18-06-XX-XX | 50                              | 255                               | 240  | 15  | 35-39                            | Native Sample  |
|        |                     | 76VP-18-06-XX-XX | 50                              | 255                               | 240  | 15  | 45-49                            | Native Sample  |
|        | 76VP-18-07          | 76VP-18-07-XX-XX | 50                              | 260                               | 240  | 20  | 20-24                            | Native Sample  |
|        |                     | 76VP-18-07-XX-XX | 50                              | 260                               | 240  | 20  | 30-34                            | Native Sample  |
|        |                     | 76VP-18-07-XX-XX | 50                              | 260                               | 240  | 20  | 40-44                            | Native Sample  |
|        |                     | 76VP-18-07-XX-XX | 50                              | 260                               | 240  | 20  | 50-54                            | Native Sample  |
|        | 76VP-18-08          | 76VP-18-08-XX-XX | 50                              | 246                               | 233  | 13  | 13-17                            | Native Sample  |
|        |                     | 76VP-18-08-XX-XX | 50                              | 246                               | 233  | 13  | 23-27                            | Native Sample  |
|        |                     | 76VP-18-08-XX-XX | 50                              | 246                               | 233  | 13  | 33-37                            | Native Sample  |
|        |                     | 76VP-18-08-XX-XX | 50                              | 246                               | 233  | 13  | 43-47                            | Native Sample  |
|        | 76VP-18-09          | 76VP-18-09-XX-XX | 50                              | 250                               | 230  | 20  | 20-24                            | Native Sample  |
|        |                     | 76VP-18-09-XX-XX | 50                              | 250                               | 230  | 20  | 30-34                            | Native Sample  |
|        |                     | 76VP-18-09-XX-XX | 50                              | 250                               | 230  | 20  | 40-44                            | Native Sample  |
|        |                     | 76VP-18-09-XX-XX | 50                              | 250                               | 230  | 20  | 50-54                            | Native Sample  |
|        | 76VP-18-10          | 76VP-18-10-XX-XX | 50                              | 250                               | 230  | 20  | 20-24                            | Native Sample  |
|        |                     | 76VP-18-10-XX-XX | 50                              | 250                               | 230  | 20  | 30-34                            | Native Sample  |
|        |                     | 76VP-18-10-XX-XX | 50                              | 250                               | 230  | 20  | 40-44                            | Native Sample  |
|        |                     | 76VP-18-10-XX-XX | 50                              | 250                               | 230  | 20  | 50-54                            | Native Sample  |

**Table 6**  
**Area 2 Groundwater Vertical Profiling Sampling Summary**  
**Area 2 Field Sampling Plan**  
**Devens PFAS Remedial Investigation Workplan**

| Area            | Location Identifier | Sample Name**    | Maximum Target Depth (ft bgs) * | Ground Surface Elevation (ft MSL) | WT Elevation (ft MSL) from nearby wells in SI or Temporary wells | Approximate Depth to Groundwater (ft bgs)** | Proposed Sample Depth (ft bgs)** | Sample Type*** |
|-----------------|---------------------|------------------|---------------------------------|-----------------------------------|--|---|----------------------------------|----------------|
| AOC-76          | 76VP-18-11          | 76VP-18-11-XX-XX | 50                              | 250                               | 230  | 20  | 20-24                            | Native Sample  |
|                 |                     | 76VP-18-11-XX-XX | 50                              | 250                               | 230  | 20  | 30-34                            | Native Sample  |
|                 |                     | 76VP-18-11-XX-XX | 50                              | 250                               | 230  | 20  | 40-44                            | Native Sample  |
|                 |                     | 76VP-18-11-XX-XX | 50                              | 250                               | 230  | 20  | 50-54                            | Native Sample  |
|                 | 76VP-18-12          | 76VP-18-12-XX-XX | 50                              | 250                               | 230  | 20  | 20-24                            | Native Sample  |
|                 |                     | 76VP-18-12-XX-XX | 50                              | 250                               | 230  | 20  | 30-34                            | Native Sample  |
|                 |                     | 76VP-18-12-XX-XX | 50                              | 250                               | 230  | 20  | 40-44                            | Native Sample  |
|                 |                     | 76VP-18-12-XX-XX | 50                              | 250                               | 230  | 20  | 50-54                            | Native Sample  |
|                 | 76VP-18-13          | 76VP-18-13-XX-XX | 50                              | 250                               | 230  | 20  | 20-24                            | Native Sample  |
|                 |                     | 76VP-18-13-XX-XX | 50                              | 250                               | 230  | 20  | 30-34                            | Native Sample  |
|                 |                     | 76VP-18-13-XX-XX | 50                              | 250                               | 230  | 20  | 40-44                            | Native Sample  |
|                 |                     | 76VP-18-13-XX-XX | 50                              | 250                               | 230  | 20  | 50-54                            | Native Sample  |
|                 | 76VP-18-14          | 76VP-18-14-XX-XX | 50                              | 250                               | 230  | 20  | 20-24                            | Native Sample  |
|                 |                     | 76VP-18-14-XX-XX | 50                              | 250                               | 230  | 20  | 30-34                            | Native Sample  |
|                 |                     | 76VP-18-14-XX-XX | 50                              | 250                               | 230  | 20  | 40-44                            | Native Sample  |
|                 |                     | 76VP-18-14-XX-XX | 50                              | 250                               | 230  | 20  | 50-54                            | Native Sample  |
|                 | 76VP-18-15          | 76VP-18-15-XX-XX | 50                              | 250                               | 230  | 20  | 20-24                            | Native Sample  |
|                 |                     | 76VP-18-15-XX-XX | 50                              | 250                               | 230  | 20  | 30-34                            | Native Sample  |
|                 |                     | 76VP-18-15-XX-XX | 50                              | 250                               | 230  | 20  | 40-44                            | Native Sample  |
|                 |                     | 76VP-18-15-XX-XX | 50                              | 250                               | 230  | 20  | 50-54                            | Native Sample  |
|                 | 76VP-18-16          | 76VP-18-16-XX-XX | 50                              | 250                               | 230  | 20  | 20-24                            | Native Sample  |
|                 |                     | 76VP-18-16-XX-XX | 50                              | 250                               | 230  | 20  | 30-34                            | Native Sample  |
|                 |                     | 76VP-18-16-XX-XX | 50                              | 250                               | 230  | 20  | 40-44                            | Native Sample  |
|                 |                     | 76VP-18-16-XX-XX | 50                              | 250                               | 230  | 20  | 50-54                            | Native Sample  |
| MacPherson Well | MPVP-18-01          | MPVP-18-01-XX-XX | 100                             | 216                               | 206  | 10  | 10-14                            | Native Sample  |
|                 |                     | MPVP-18-01-XX-XX | 100                             | 216                               | 206  | 10  | 20-24                            | Native Sample  |
|                 |                     | MPVP-18-01-XX-XX | 100                             | 216                               | 206  | 10  | 30-34                            | Native Sample  |
|                 |                     | MPVP-18-01-XX-XX | 100                             | 216                               | 206  | 10  | 40-44                            | Native Sample  |
|                 |                     | MPVP-18-01-XX-XX | 100                             | 216                               | 206  | 10  | 50-54                            | Native Sample  |
|                 |                     | MPVP-18-01-XX-XX | 100                             | 216                               | 206  | 10  | 60-64                            | Native Sample  |
|                 |                     | MPVP-18-01-XX-XX | 100                             | 216                               | 206  | 10  | 70-74                            | Native Sample  |
|                 |                     | MPVP-18-01-XX-XX | 100                             | 216                               | 206  | 10  | 80-84                            | Native Sample  |
|                 |                     | MPVP-18-01-XX-XX | 100                             | 216                               | 206  | 10  | 90-94                            | Native Sample  |

**Table 6**  
**Area 2 Groundwater Vertical Profiling Sampling Summary**  
**Area 2 Field Sampling Plan**  
**Devens PFAS Remedial Investigation Workplan**

| Area | Location Identifier | Sample Name**    | Maximum Target Depth (ft bgs) * | Ground Surface Elevation (ft MSL) | WT Elevation (ft MSL) from nearby wells in SI or Temporary wells | Approximate Depth to Groundwater (ft bgs)** | Proposed Sample Depth (ft bgs)** | Sample Type*** |
|------|---------------------|------------------|---------------------------------|-----------------------------------|--|---|----------------------------------|----------------|
|      | MPVP-18-02          | MPVP-18-02-XX-XX | 100                             | 216                               | 206  | 10  | 10-20                            | Native Sample  |
|      |                     | MPVP-18-02-XX-XX | 100                             | 216                               | 206  | 10  | 20-30                            | Native Sample  |
|      |                     | MPVP-18-02-XX-XX | 100                             | 216                               | 206  | 10  | 30-40                            | Native Sample  |
|      |                     | MPVP-18-02-XX-XX | 100                             | 216                               | 206  | 10  | 40-50                            | Native Sample  |
|      |                     | MPVP-18-02-XX-XX | 100                             | 216                               | 206  | 10  | 50-60                            | Native Sample  |
|      |                     | MPVP-18-02-XX-XX | 100                             | 216                               | 206  | 10  | 60-70                            | Native Sample  |
|      |                     | MPVP-18-02-XX-XX | 100                             | 216                               | 206  | 10  | 70-80                            | Native Sample  |
|      |                     | MPVP-18-02-XX-XX | 100                             | 216                               | 206  | 10  | 80-90                            | Native Sample  |
|      |                     | MPVP-18-02-XX-XX | 100                             | 216                               | 206  | 10  | 90-100                           | Native Sample  |
|      | MPVP-18-03          | MPVP-18-03-XX-XX | 100                             | 216                               | 206  | 10  | 10-20                            | Native Sample  |
|      |                     | MPVP-18-03-XX-XX | 100                             | 216                               | 206  | 10  | 20-30                            | Native Sample  |
|      |                     | MPVP-18-03-XX-XX | 100                             | 216                               | 206  | 10  | 30-40                            | Native Sample  |
|      |                     | MPVP-18-03-XX-XX | 100                             | 216                               | 206  | 10  | 40-50                            | Native Sample  |
|      |                     | MPVP-18-03-XX-XX | 100                             | 216                               | 206  | 10  | 50-60                            | Native Sample  |
|      |                     | MPVP-18-03-XX-XX | 100                             | 216                               | 206  | 10  | 60-70                            | Native Sample  |
|      |                     | MPVP-18-03-XX-XX | 100                             | 216                               | 206  | 10  | 70-80                            | Native Sample  |
|      |                     | MPVP-18-03-XX-XX | 100                             | 216                               | 206  | 10  | 80-90                            | Native Sample  |
|      |                     | MPVP-18-03-XX-XX | 100                             | 216                               | 206  | 10  | 90-100                           | Native Sample  |
|      | MPVP-18-04          | MPVP-18-04-XX-XX | 100                             | 226                               | 206  | 10  | 10-20                            | Native Sample  |
|      |                     | MPVP-18-04-XX-XX | 100                             | 226                               | 206  | 10  | 20-30                            | Native Sample  |
|      |                     | MPVP-18-04-XX-XX | 100                             | 226                               | 206  | 10  | 30-40                            | Native Sample  |
|      |                     | MPVP-18-04-XX-XX | 100                             | 226                               | 206  | 10  | 40-50                            | Native Sample  |
|      |                     | MPVP-18-04-XX-XX | 100                             | 226                               | 206  | 10  | 50-60                            | Native Sample  |
|      |                     | MPVP-18-04-XX-XX | 100                             | 226                               | 206  | 10  | 60-70                            | Native Sample  |
|      |                     | MPVP-18-04-XX-XX | 100                             | 226                               | 206  | 10  | 70-80                            | Native Sample  |
|      |                     | MPVP-18-04-XX-XX | 100                             | 226                               | 206  | 10  | 80-90                            | Native Sample  |
|      |                     | MPVP-18-04-XX-XX | 100                             | 226                               | 206  | 10  | 90-100                           | Native Sample  |
|      | MPVP-18-05          | MPVP-18-05-XX-XX | 100                             | 216                               | 206  | 10  | 10-20                            | Native Sample  |
|      |                     | MPVP-18-05-XX-XX | 100                             | 216                               | 206  | 10  | 20-30                            | Native Sample  |
|      |                     | MPVP-18-05-XX-XX | 100                             | 216                               | 206  | 10  | 30-40                            | Native Sample  |
|      |                     | MPVP-18-05-XX-XX | 100                             | 216                               | 206  | 10  | 40-50                            | Native Sample  |

**Table 6**  
**Area 2 Groundwater Vertical Profiling Sampling Summary**  
**Area 2 Field Sampling Plan**  
**Devens PFAS Remedial Investigation Workplan**

| Area | Location Identifier | Sample Name**    | Maximum Target Depth (ft bgs) * | Ground Surface Elevation (ft MSL) | WT Elevation (ft MSL) from nearby wells in SI or Temporary wells | Approximate Depth to Groundwater (ft bgs)** | Proposed Sample Depth (ft bgs)** | Sample Type*** |
|------|---------------------|------------------|---------------------------------|-----------------------------------|--|---|----------------------------------|----------------|
|      |                     | MPVP-18-05-XX-XX | 100                             | 216                               | 206  | 10  | 50-60                            | Native Sample  |
|      |                     | MPVP-18-05-XX-XX | 100                             | 216                               | 206  | 10  | 60-70                            | Native Sample  |
|      |                     | MPVP-18-05-XX-XX | 100                             | 216                               | 206  | 10  | 70-80                            | Native Sample  |
|      |                     | MPVP-18-05-XX-XX | 100                             | 216                               | 206  | 10  | 80-90                            | Native Sample  |
|      |                     | MPVP-18-05-XX-XX | 100                             | 216                               | 206  | 10  | 90-100                           | Native Sample  |
|      | MPVP-18-06          | MPVP-18-06-XX-XX | 100                             | 216                               | 206  | 10  | 10-20                            | Native Sample  |
|      |                     | MPVP-18-06-XX-XX | 100                             | 216                               | 206  | 10  | 20-30                            | Native Sample  |
|      |                     | MPVP-18-06-XX-XX | 100                             | 216                               | 206  | 10  | 30-40                            | Native Sample  |
|      |                     | MPVP-18-06-XX-XX | 100                             | 216                               | 206  | 10  | 40-50                            | Native Sample  |
|      |                     | MPVP-18-06-XX-XX | 100                             | 216                               | 206  | 10  | 50-60                            | Native Sample  |
|      |                     | MPVP-18-06-XX-XX | 100                             | 216                               | 206  | 10  | 60-70                            | Native Sample  |
|      |                     | MPVP-18-06-XX-XX | 100                             | 216                               | 206  | 10  | 70-80                            | Native Sample  |
|      |                     | MPVP-18-06-XX-XX | 100                             | 216                               | 206  | 10  | 80-90                            | Native Sample  |
|      |                     | MPVP-18-06-XX-XX | 100                             | 216                               | 206  | 10  | 90-100                           | Native Sample  |
|      | MPVP-18-07          | MPVP-18-07-XX-XX | 100                             | 216                               | 206  | 10  | 10-20                            | Native Sample  |
|      |                     | MPVP-18-07-XX-XX | 100                             | 216                               | 206  | 10  | 20-30                            | Native Sample  |
|      |                     | MPVP-18-07-XX-XX | 100                             | 216                               | 206  | 10  | 30-40                            | Native Sample  |
|      |                     | MPVP-18-07-XX-XX | 100                             | 216                               | 206  | 10  | 40-50                            | Native Sample  |
|      |                     | MPVP-18-07-XX-XX | 100                             | 216                               | 206  | 10  | 50-60                            | Native Sample  |
|      |                     | MPVP-18-07-XX-XX | 100                             | 216                               | 206  | 10  | 60-70                            | Native Sample  |
|      |                     | MPVP-18-07-XX-XX | 100                             | 216                               | 206  | 10  | 70-80                            | Native Sample  |
|      |                     | MPVP-18-07-XX-XX | 100                             | 216                               | 206  | 10  | 80-90                            | Native Sample  |
|      |                     | MPVP-18-07-XX-XX | 100                             | 216                               | 206  | 10  | 90-100                           | Native Sample  |
|      | MPVP-18-08          | MPVP-18-08-XX-XX | 100                             | 236                               | 206  | 10  | 10-20                            | Native Sample  |
|      |                     | MPVP-18-08-XX-XX | 100                             | 236                               | 206  | 10  | 20-30                            | Native Sample  |
|      |                     | MPVP-18-08-XX-XX | 100                             | 236                               | 206  | 10  | 30-40                            | Native Sample  |
|      |                     | MPVP-18-08-XX-XX | 100                             | 236                               | 206  | 10  | 40-50                            | Native Sample  |
|      |                     | MPVP-18-08-XX-XX | 100                             | 236                               | 206  | 10  | 50-60                            | Native Sample  |
|      |                     | MPVP-18-08-XX-XX | 100                             | 236                               | 206  | 10  | 60-70                            | Native Sample  |
|      |                     | MPVP-18-08-XX-XX | 100                             | 236                               | 206  | 10  | 70-80                            | Native Sample  |
|      |                     | MPVP-18-08-XX-XX | 100                             | 236                               | 206  | 10  | 80-90                            | Native Sample  |

**Table 6**  
**Area 2 Groundwater Vertical Profiling Sampling Summary**  
**Area 2 Field Sampling Plan**  
**Devens PFAS Remedial Investigation Workplan**

| Area          | Location Identifier | Sample Name**     | Maximum Target Depth (ft bgs) * | Ground Surface Elevation (ft MSL) | WT Elevation (ft MSL) from nearby wells in SI or Temporary wells | Approximate Depth to Groundwater (ft bgs)** | Proposed Sample Depth (ft bgs)** | Sample Type***  |
|---------------|---------------------|-------------------|---------------------------------|-----------------------------------|--|---|----------------------------------|-----------------|
|               |                     | MPVP-18-08-XX-XX  | 100                             | 236                               | 206  | 10  | 90-100                           | Native Sample   |
| QC Samples*** | 32VP-18-02          | A2-VP-DUP-MMDDYY  | NA                              | NA                                | NA   | NA  | NA                               | Field Duplicate |
|               | 32VP-18-03          | 32VP-18-03-XX-XX  | NA                              | NA                                | NA   | NA  | NA                               | MS/MSD          |
|               | 43GVP-18-01         | A2-VP-DUP-MMDDYY  | NA                              | NA                                | NA   | NA  | NA                               | Field Duplicate |
|               | 43GVP-18-04         | 43GVP-18-04-XX-XX | NA                              | NA                                | NA   | NA  | NA                               | MS/MSD          |
|               | 76VP-18-10          | A2-VP-DUP-MMDDYY  | NA                              | NA                                | NA   | NA  | NA                               | Field Duplicate |
|               | 76VP-18-11          | 76VP-18-11-XX-XX  | NA                              | NA                                | NA   | NA  | NA                               | MS/MSD          |
|               | MPVP-18-01          | MPVP-DUP-XX       | NA                              | NA                                | NA   | NA  | NA                               | Field Duplicate |
|               | MPVP-18-04          | MPVP-18-04-XX-XX  | NA                              | NA                                | NA   | NA  | NA                               | MS/MSD          |
|               | NA                  | A2-VP-EB-MMDDYY   | NA                              | NA                                | NA   | NA  | NA                               | Equipment Blank |
|               | NA                  | A2-VP-FRB-MMDDYY  | NA                              | NA                                | NA   | NA  | NA                               | Field Blank     |

**Notes:**

All samples will be analyzed for PFAS via isotope dilution. Analyte list is specified in UFP-QAPP Worksheet #15.

If additional groundwater vertical profiles are advanced at an AOC, the location identifiers, sample identifiers and QC sample identifiers will be sequential to the locations provided in the table above.

\* Maximum target depth is anticipated depth to bedrock based on previous Remedial Investigation at AOCs 32 (ABB, 1994), 43A (ABB, 1996a) and 43G (ABB, 1996b) or a review of the Surficial Geology overlay from MassGIS ([https://maps.massgis.state.ma.us/map\\_ol/oliver.php](https://maps.massgis.state.ma.us/map_ol/oliver.php)). The actual depths and number of sampling intervals at a given location may be more or less than anticipated, depending on field conditions observed during profiling. Depth to bedrock may be confirmed at select locations during installation of long-term monitoring wells.

\*\* Approximate depth to groundwater and proposed sample depths are for planning purposes and are estimated from water table elevations observed at nearby temporary wells or long-term monitoring wells sampled during the SI or SI Addendum (BERS-Weston, 2018a, 2018b) or LTM monitoring (KGS, 2018b). Actual depth to water will be measured during advancement of the groundwater vertical profile borings and sample depths and sample nomenclature will be adjusted to reflect actual conditions measured at the time of groundwater vertical profiling.

\*\*\* Field Quality Control Samples (FD, MS/MSD, EBs and Field Reagent Blanks) will be collected at a frequency specified in UFP-QAPP worksheet #20. The FD will be collected at a 10% frequency, MS/MSD will be collected at a 5% frequency, EB will be collected at least once a week per piece of equipment, the FRB will be collected is at least once during the event. The frequency will be applied to all of Area 2. The QC samples IDs are approximated and can change based on field conditions. Equipment blanks only collected if non-disposal equipment is used.

XX = Final sample name to be determined in the field. For the native samples XX-XX will represent the depth relative to ground surface of the sample interval. For the QC samples XX represents the sample number and will be incremented as each sample is collected. MS/MSD samples will be identified in the notes of the chain of custody (i.e., a unique field sample identifier will not be used to denote a MS/MSD sample).

AOC = area of contamination

FD = field duplicate

MS/MSD = matrix spike/matrix spike duplicate

QC = quality control

EB = equipment rinsate blank

ft bgs = feet below ground surface

MSL = mean sea level

SI = site inspection

FRB = field reagent blank

LTM = long-term monitoring program

NA = not applicable



**Table 7**  
**Area 2 Soil Boring Sampling Summary**  
**Area 2 Field Sampling Plan**  
**Devens PFAS Remedial Investigation Workplan**

| Area   | Location Identifier  | Sample Name*     | Proposed Sample Depth (ft bgs)* | Approximate Depth to Groundwater (ft bgs)** | Sample Type   |
|--|--|------------------|---------------------------------|---|---------------|
| AOC 32/43A<br>Contingency Borings                      | Up to Five a Planned<br>32(or 43A) SB-18-01 through -18-05 | to be determined | 0-0.5                           | 25  | Native Sample |
|  |  |                  | 0.5-3                           | 25  | Native Sample |
|  |  |                  | 3-7                             | 25  | Native Sample |
|  |  |                  | 7-15                            | 25  | Native Sample |
|  |  |                  | 23-25                           | 25  | Native Sample |
| AOC 43G<br>Contingency Borings                         | Up to Five a Planned<br>43GSB-18-01 through -18-05         | to be determined | 0-0.5                           | 25  | Native Sample |
|  |  |                  | 0.5-3                           | 25  | Native Sample |
|  |  |                  | 3-7                             | 25  | Native Sample |
|  |  |                  | 7-15                            | 25  | Native Sample |
|  |  |                  | 23-25                           | 25  | Native Sample |
| AOC 43J<br>Contingency Borings                         | Up to Five a Planned<br>43JSB-18-01 through -18-05         | to be determined | 0-0.5                           | 25  | Native Sample |
|  |  |                  | 0.5-3                           | 25  | Native Sample |
|  |  |                  | 3-7                             | 25  | Native Sample |
|  |  |                  | 7-15                            | 25  | Native Sample |
|  |  |                  | 23-25                           | 25  | Native Sample |
| MacPherson Water<br>Supply Well<br>Contingency Borings | Up to Five Planned<br>MPSB-18-01 through -18-05            | to be determined | 0-0.5                           | 25  | Native Sample |
|  |  |                  | 0.5-3                           | 25  | Native Sample |
|  |  |                  | 3-7                             | 25  | Native Sample |
|  |  |                  | 7-15                            | 25  | Native Sample |
|  |  |                  | 23-25                           | 25  | Native Sample |
| AOC 76   | 76SB-18-01   | 76SB-18-01-0-1   | 0-1                             | 13  | Native Sample |
|  |  | 76SB-18-01-3-7   | 3-7                             | 13  | Native Sample |
|  |  | 76SB-18-01-11-13 | 11-13                           | 13  | Native Sample |
|  | 76SB-18-02   | 76SB-18-02-0-1   | 0-1                             | 20  | Native Sample |
|  |  | 76SB-18-02-3-7   | 3-7                             | 20  | Native Sample |
|  |  | 76SB-18-02-18-20 | 18-20                           | 20  | Native Sample |
|  | 76SB-18-03   | 76SB-18-03-0-1   | 0-1                             | 13  | Native Sample |
|  |  | 76SB-18-03-3-7   | 3-7                             | 13  | Native Sample |
|  |  | 76SB-18-03-11-13 | 11-13                           | 13  | Native Sample |
|  | 76SB-18-04   | 76SB-18-04-0-1   | 0-1                             | 13  | Native Sample |
|  |  | 76SB-18-04-3-7   | 3-7                             | 13  | Native Sample |
|  |  | 76SB-18-04-11-13 | 11-13                           | 13  | Native Sample |

**Table 7**  
**Area 2 Soil Boring Sampling Summary**  
**Area 2 Field Sampling Plan**  
**Devens PFAS Remedial Investigation Workplan**

| Area   | Location Identifier | Sample Name*     | Proposed Sample Depth (ft bgs)* | Approximate Depth to Groundwater (ft bgs)** | Sample Type   |
|--------|---------------------|------------------|---------------------------------|---|---------------|
| AOC 76 | 76SB-18-05          | 76SB-18-05-0-1   | 0-1                             | 20  | Native Sample |
|        |                     | 76SB-18-05-3-7   | 3-7                             | 20  | Native Sample |
|        |                     | 76SB-18-05-18-20 | 18-20                           | 20  | Native Sample |
|        | 76SB-18-06          | 76SB-18-06-0-1   | 0-1                             | 15  | Native Sample |
|        |                     | 76SB-18-06-3-7   | 3-7                             | 15  | Native Sample |
|        |                     | 76SB-18-06-13-15 | 13-15                           | 15  | Native Sample |
|        | 76SB-18-07          | 76SB-18-07-0-1   | 0-1                             | 15  | Native Sample |
|        |                     | 76SB-18-07-3-7   | 3-7                             | 15  | Native Sample |
|        |                     | 76SB-18-13-15    | 13-15                           | 15  | Native Sample |
|        | 76SB-18-08          | 76SB-18-08-0-1   | 0-1                             | 13  | Native Sample |
|        |                     | 76SB-18-08-3-7   | 3-7                             | 13  | Native Sample |
|        |                     | 76SB-18-08-11-13 | 11-13                           | 13  | Native Sample |
|        | 76SB-18-09          | 76SB-18-09-0-1   | 0-1                             | 20  | Native Sample |
|        |                     | 76SB-18-09-3-7   | 3-7                             | 20  | Native Sample |
|        |                     | 76SB-18-09-18-20 | 18-20                           | 20  | Native Sample |
|        | 76SB-18-10          | 76SB-18-10-0-1   | 0-1                             | 27  | Native Sample |
|        |                     | 76SB-18-10-3-7   | 3-7                             | 27  | Native Sample |
|        |                     | 76SB-18-10-25-27 | 25-27                           | 27  | Native Sample |
|        | 76SB-18-11          | 76SB-18-11-0-1   | 0-1                             | 27  | Native Sample |
|        |                     | 76SB-18-11-3-7   | 3-7                             | 27  | Native Sample |
|        |                     | 76SB-18-11-25-27 | 25-27                           | 27  | Native Sample |
|        | 76SB-18-12          | 76SB-18-12-0-1   | 0-1                             | 20  | Native Sample |
|        |                     | 76SB-18-12-3-7   | 3-7                             | 20  | Native Sample |
|        |                     | 76SB-18-12-18-20 | 18-20                           | 20  | Native Sample |
|        | 76SB-18-13          | 76SB-18-13-0-1   | 0-1                             | 15  | Native Sample |
|        |                     | 76SB-18-13-3-7   | 3-7                             | 15  | Native Sample |
|        |                     | 76SB-18-13-13-15 | 13-15                           | 15  | Native Sample |

**Table 7**  
**Area 2 Soil Boring Sampling Summary**  
**Area 2 Field Sampling Plan**  
**Devens PFAS Remedial Investigation Workplan**

| Area          | Location Identifier | Sample Name*     | Proposed Sample Depth (ft bgs)* | Approximate Depth to Groundwater (ft bgs)** | Sample Type     |
|---------------|---------------------|------------------|---------------------------------|---|-----------------|
| QC Samples*** | 76SB-18-01          | A2-SB-DUP-MMDDYY | NA                              | NA  | Field Duplicate |
|               | 76SB-18-03          | A2-SB-DUP-MMDDYY | NA                              | NA  | Field Duplicate |
|               | 76SB-18-04          | A2-SB-DUP-MMDDYY | NA                              | NA  | Field Duplicate |
|               | 76SB-18-10          | A2-SB-DUP-MMDDYY | NA                              | NA  | Field Duplicate |
|               | 76SB-18-05          | 76SB-18-05-XX-XX | NA                              | NA  | MS/MSD          |
|               | 76SB-18-12          | 76SB-18-12-XX-XX | NA                              | NA  | MS/MSD          |
|               | NA                  | A2-SB-EB-MMDDYY  | NA                              | NA  | Equipment Blank |
|               | NA                  | A2-SB-FRB-MMDDYY | NA                              | NA  | Field Blank     |

**Notes:**

All samples analyzed for PFAS via isotope dilution. Select samples may be analyzed for total oxidizable precursor assay and total organic carbon.

If additional soil sampling locations are established at an AOC, the location identifiers, sample identifiers and QC sample identifiers will be sequential to the locations provided in the table above.

\* AOC 76 samples are to be collected from 0-1 ft bgs, 3-7 ft bgs, and 2 feet above the water table. Sample name may be modified in the field depending on sample depth.

\*\* Approximate depth to groundwater is for planning purposes and is estimated from the water table elevations observed at nearby temporary wells or long-term monitoring wells sampled during the SI and LTM activities. Actual depth to water will be measured during advancement of the soil borings and the final depth of soil sampling intervals will end at the water table at locations where the water table is less than 15 feet. If the water table is encountered at a depth less than 17 ft bgs then the final soil sampling interval at the boring will be shortened by the appropriate amount to collect a separate 2-foot sample just above the water table to assess leaching threat to groundwater.

\*\*\*\* Field Quality Control Samples (FD, MS/MSD, EBs and Field Reagent Blanks) will be collected at a frequency specified in UFP-QAPP worksheet #20. The FD will be collected at a 10% frequency, MS/MSD will be collected at a 5% frequency, EB will be collected at least once a week, the FRB will be collected at least once during each sampling event. The frequency will be applied to all of Area 2. The QC samples IDs are approximated and can change based on field conditions. Equipment blanks only collected if non-disposal equipment is used. Field quality control samples will not be collected for total oxidizable precursor analysis.

AOC = area of contamination

ft bgs = feet below ground surface

LTM = long-term monitoring

MS/MSD = matrix spike/matrix spike duplicate

NA = not applicable

QC = quality control

SI = site inspection

XX = Final sample name to be determined in the field. For the QC samples XX represents the sample number and will be incremented as each sample is collected. MS/MSD samples will be identified in the notes of the chain of custody (i.e., a unique field sample identifier will not be used to denote a MS/MSD sample).

**Table 8**  
**Area 2 New Monitoring Well Rationale**  
**Area 2 Field Sampling Plan**  
**Devens PFAS Remedial Investigation Workplan**

| Number of New Monitoring Wells | Rationale  | Field Lithologic Classification  | Screen settings | TOC in Soil  | Grain-size analysis   |
|--------------------------------|--|--|-----------------|--|---|
| <b>Area of Concern 32</b>      |  |  |                 |  |   |
| 3                              | Installation of up to two new overburden and one bedrock monitoring wells is planned to augment the existing monitoring well network. Locations will be based on a review of existing monitoring well and vertical profile data. The groundwater monitoring well network will be designed to monitor groundwater within the PFAS plume as well as provide bounding wells upgradient, cross gradient and downgradient of the plume.                           | Yes - at selection locations from the water table to the bottom of the boring. | TBD             | Soil samples collected at select locations will be submitted for TOC analysis. | Soil samples collected from select intervals at select locations will be submitted for grain-size analysis. |
| <b>Area of Concern 43A</b>     |  |  |                 |  |   |
| 2                              | Installation of up to two new monitoring wells is planned. Locations will be based on a review of existing monitoring well and vertical profile data. The groundwater monitoring well network will be designed to monitor groundwater within the PFAS plume as well as provide bounding wells upgradient, cross gradient and downgradient of the plume.  | Yes - at selection locations from the water table to the bottom of the boring. | TBD             | Soil samples collected at select locations will be submitted for TOC analysis. | Soil samples collected from select intervals at select locations will be submitted for grain-size analysis. |
| <b>Area of Concern 43G</b>     |  |  |                 |  |   |
| 2                              | Installation of up to two new monitoring wells is planned. Locations will be based on a review of existing monitoring well and vertical profile data. The groundwater monitoring well network will be designed to monitor groundwater within the PFAS plume as well as provide bounding wells upgradient, cross gradient and downgradient of the plume.  | Yes - at selection locations from the water table to the bottom of the boring. | TBD             | Soil samples collected at select locations will be submitted for TOC analysis. | Soil samples collected from select intervals at select locations will be submitted for grain-size analysis. |
| <b>Area of Concern 76</b>      |  |  |                 |  |   |
| 12                             | Installation of up to 12 new piezometers screened at the water table is planned. These piezometers will be installed at twelve groundwater vertical profiling locations and will be used to measure depth to water and calculate groundwater flow direction at AOC76. The locations of piezometers will be selected to support calculation of groundwater flow direction and may or may not be used as a potential groundwater monitoring location for PFAS. | No   | TBD             | No   | No  |
| 10                             | Installation of up to 10 new monitoring wells is planned. Locations will be based on a review of vertical profile data. The PFAS groundwater monitoring well network will be designed to monitor groundwater within the PFAS plume as well as provide bounding wells upgradient, cross gradient and downgradient of the plume.   | Yes - at selection locations from the water table to the bottom of the boring. | TBD             | Soil samples collected at select locations will be submitted for TOC analysis. | Soil samples collected from select intervals at select locations will be submitted for grain-size analysis. |

**Table 8**  
**Area 2 New Monitoring Well Rationale**  
**Area 2 Field Sampling Plan**  
**Devens PFAS Remedial Investigation Workplan**

| Number of New Monitoring Wells                | Rationale  | Field Lithologic Classification  | Screen settings | TOC in Soil  | Grain-size analysis   |
|---|--|--|-----------------|--|---|
| <b>MacPherson Municipal Water Supply Well</b> |  |  |                 |  |   |
| 6   | Installation of up to 6 new monitoring wells is planned. Locations will be based on a review of vertical profile data. The groundwater monitoring well network will be designed to monitor groundwater within the PFAS plume as well as provide bounding wells upgradient, cross gradient and downgradient of the plume. | Yes - at selection locations from the water table to the bottom of the boring. | TBD             | Soil samples collected at select locations will be submitted for TOC analysis. | Soil samples collected from select intervals at select locations will be submitted for grain-size analysis. |

Notes:

AOC = area of contamination

TBD = to be determined. Screen settings will be determined in consultation with the stakeholders after a review of the groundwater data.

TOC = total organic carbon

Table 9  
Area 2 Soil Sampling During New Monitoring Well Installation Sampling Summary  
Area 2 Field Sampling Plan  
Devens PFAS Remedial Investigation Workplan

| Location     | Location Identifier | Sample Name*          | Proposed Sample Depth (ft bgs)** | Sample Type         |
|--------------|---------------------|-----------------------|----------------------------------|---------------------|
| AOC 32/43A   | 32M-18-02X          | 32M-18-02X-SO-XX-XX   | TBD                              | Native Sample       |
|              | 32M-18-03X          | 32M-18-03X-SO-XX-XX   | TBD                              | Native Sample       |
|              | 32M-18-01XBR        | 32M-18-01XBR-SO-XX-XX | TBD                              | Native Sample       |
|              | 43M-18-01X          | 43M-18-01X-SO-XX-XX   | TBD                              | Native Sample       |
|              | 43M-18-02X          | 43M-18-02X-SO-XX-XX   | TBD                              | Native Sample       |
| AOC 43G      | XGM-18-01X          | XGM-18-01X-SO-XX-XX   | TBD                              | Native Sample       |
|              | XGM-18-02X          | XGM-18-02X-SO-XX-XX   | TBD                              | Native Sample       |
| AOC 76       | 76M-18-01X          | 76M-18-01X-SO-XX-XX   | TBD                              | Native Sample       |
|              | 76M-18-02X          | 76M-18-02X-SO-XX-XX   | TBD                              | Native Sample       |
|              | 76M-18-03X          | 76M-18-03X-SO-XX-XX   | TBD                              | Native Sample       |
|              | 76M-18-04X          | 76M-18-04X-SO-XX-XX   | TBD                              | Native Sample       |
|              | 76M-18-05X          | 76M-18-05X-SO-XX-XX   | TBD                              | Native Sample       |
|              | 76M-18-06X          | 76M-18-06X-SO-XX-XX   | TBD                              | Native Sample       |
|              | 76M-18-07X          | 76M-18-07X-SO-XX-XX   | TBD                              | Native Sample       |
|              | 76M-18-08X          | 76M-18-08X-SO-XX-XX   | TBD                              | Native Sample       |
|              | 76M-18-09X          | 76M-18-09X-SO-XX-XX   | TBD                              | Native Sample       |
|              | 76M-18-10X          | 76M-18-10X-SO-XX-XX   | TBD                              | Native Sample       |
| MacPherson   | MPM-18-01X          | MPM-18-01X-SO-XX-XX   | TBD                              | Native Sample       |
|              | MPM-18-02X          | MPM-18-02X-SO-XX-XX   | TBD                              | Native Sample       |
|              | MPM-18-03X          | MPM-18-03X-SO-XX-XX   | TBD                              | Native Sample       |
|              | MPM-18-04X          | MPM-18-04X-SO-XX-XX   | TBD                              | Native Sample       |
|              | MPM-18-05X          | MPM-18-05X-SO-XX-XX   | TBD                              | Native Sample       |
|              | MPM-18-06X          | MPM-18-06X-SO-XX-XX   | TBD                              | Native Sample       |
| QC Samples** | 32M-18-02X          | A2-MW-SO-DUP-MMDDYY   |                                  | Field Duplicate     |
|              | 76M-18-03X          | A2-MW-SO-DUP-MMDDYY   |                                  | Field Duplicate     |
|              | MPM-18-03X          | A2-MW-SO-DUP-MMDDYY   |                                  | Field Duplicate     |
|              | 32M-18-03X          | 32M-18-03X-SO-XX-XX   |                                  | MS/MSD              |
|              | 76M-18-06X          | 76M-18-06X-SO-XX-XX   |                                  | MS/MSD              |
|              | NA                  | A2-MW-SO-EB-MMDDYY    |                                  | Equipment Blank     |
|              | NA                  | A2-MW-SO-FRB-MMDDYY   |                                  | Field Reagent Blank |

Notes:

Selected samples will be analyzed for total organic carbon, and grain size.

\* It is estimated locations at each area of investigation will be drilled during monitoring well installation and soil samples may be collected at that time. The exact locations are not known. The locations where samples will be collected will be determined before the locations are drilled.

\*\* Sample name will be determined in the field depending on sample depth. The sample depth will be determined before the locations are drilled.

Table 9  
Area 2 Soil Sampling During New Monitoring Well Installation Sampling Summary  
Area 2 Field Sampling Plan  
Devens PFAS Remedial Investigation Workplan

\*\*\* Field Quality Control Samples (FD, MS/MSD, EBs and Field Reagent Blanks) will be collected at a frequency specified in UFP-QAPP worksheet #20. The FD will be collected at a 10% frequency, MS/MSD will be collected at a 5% frequency, EB will be collected at least once a week per piece of equipment, the FRB will be collected is at least once during each sampling event. The frequency will be applied to all of Area 2. Equipment blanks only collected if non-disposal equipment is used. Field quality control samples will not be collected for total oxidizable precursor analysis.

AOC = area of contamination

FRB = field reagent blank

QC = quality control

EB = equipment blank

MS/MSD = matrix spike/matrix spike duplicate

FD = field duplicate

TBD = to be determined

XX = Final sample name to be determined in the field. MS/MSD samples will be identified in the notes of the chain of custody (i.e., a unique field sample identifier will not be used to denote a MS/MSD sample).

**Table 10**  
**Area 2 New Monitoring Well Sampling Summary**  
**Area 2 Field Sampling Plan**  
**Devens PFAS Remedial Investigation Workplan**

| Location     | Location Identifier | Sample Name*       | Sample Type         |
|--------------|---------------------|--------------------|---------------------|
| AOC 32/43A   | 32M-18-02X          | 32M-18-02X-MONYY   | Native Sample       |
|              | 32M-18-03X          | 32M-18-03X-MONYY   | Native Sample       |
|              | 32M-18-01XBR        | 32M-18-01XBR-MONYY | Native Sample       |
|              | 43M-18-01X          | 43M-18-01X-MONYY   | Native Sample       |
|              | 43M-18-02X          | 43M-18-02X-MONYY   | Native Sample       |
| AOC 43G      | XGM-18-01X          | XGM-18-01X-MONYY   | Native Sample       |
|              | XGM-18-02X          | XGM-18-02X-MONYY   | Native Sample       |
| AOC 76       | 76M-18-01X          | 76M-18-01X-MONYY   | Native Sample       |
|              | 76M-18-02X          | 76M-18-02X-MONYY   | Native Sample       |
|              | 76M-18-03X          | 76M-18-03X-MONYY   | Native Sample       |
|              | 76M-18-04X          | 76M-18-04X-MONYY   | Native Sample       |
|              | 76M-18-05X          | 76M-18-05X-MONYY   | Native Sample       |
|              | 76M-18-06X          | 76M-18-06X-MONYY   | Native Sample       |
|              | 76M-18-07X          | 76M-18-07X-MONYY   | Native Sample       |
|              | 76M-18-08X          | 76M-18-08X-MONYY   | Native Sample       |
|              | 76M-18-09X          | 76M-18-09X-MONYY   | Native Sample       |
|              | 76M-18-10X          | 76M-18-10X-MONYY   | Native Sample       |
| MacPherson   | MPM-18-01X          | MPM-18-01X-MONYY   | Native Sample       |
|              | MPM-18-02X          | MPM-18-02X-MONYY   | Native Sample       |
|              | MPM-18-03X          | MPM-18-03X-MONYY   | Native Sample       |
|              | MPM-18-04X          | MPM-18-04X-MONYY   | Native Sample       |
|              | MPM-18-05X          | MPM-18-05X-MONYY   | Native Sample       |
|              | MPM-18-06X          | MPM-18-06X-MONYY   | Native Sample       |
| QC Samples** | 32M-18-02X          | A2-MW-DUP-MMDDYY   | Field Duplicate     |
|              | 76M-18-03X          | A2-MW-DUP-MMDDYY   | Field Duplicate     |
|              | MPM-18-03X          | A2-MW-DUP-MMDDYY   | Field Duplicate     |
|              | 32M-18-03X          | 32M-18-03-MONYY    | MS/MSD              |
|              | 76M-18-06X          | 76M-18-06X-MONYY   | MS/MSD              |
|              | NA                  | A2-MW-EB-MMDDYY    | Equipment Blank     |
|              | NA                  | A2-MW-FRB-MMDDYY   | Field Reagent Blank |

Notes:

All samples will be analyzed for PFAS via isotope dilution. Select samples will be analyzed for total oxidizable precursor assay and dissolved organic carbon.

\* = The sample name will consist of the well identifier followed by the month and the year the sample was collected. The month will be represented by three letters and the year by two numbers.

\*\* Field Quality Control Samples (FD, MS/MSD, EBs and Field Reagent Blanks) will be collected at a frequency specified in UFP-QAPP worksheet #20. The FD will be collected at a 10% frequency, MS/MSD will be collected at a 5% frequency, EB will be collected at least once a week per piece of equipment, the FRB will be collected is at least once during each sampling event per AOC. The frequency will be applied to all of Area 2. The QC samples IDs are approximated and can change based on field conditions. Equipment blanks only collected if non-disposal equipment is used. Field quality control samples will not be collected for total oxidizable precursor analysis.

AOC = area of contamination

EB = equipment blank

FD = field duplicate

FRB = field reagent blank

MS/MSD = matrix spike/matrix spike duplicate

QC = quality control





## **APPENDIX A**

### **Referenced PFAS RI QAPP Worksheets**

### QAPP WORKSHEET #3: DISTRIBUTION LIST FOR DEVENS

| QAPP Recipients  | Title  | Organization          | E-mail Address                  |
|------------------|--|-----------------------|---------------------------------|
| Mark Applebee    | Program Manager                                  | KGS                   | mapplebee@komangs.com           |
| James Ropp       | Project Manager (PM)                             | KGS                   | jropp@komangs.com               |
| John Rawlings    | Corporate Director of Safety and Quality Control | KOMAN                 | jrawlings@komaninc.com          |
| Katherine Thomas | Technical Lead                                   | KGS                   | kthomas@komangs.com             |
| Kevin Anderson   | KGS Field Team Lead                              | KGS                   | kanderson@komangs.com           |
| Laurie Ekes      | Project Chemist                                  | KGS                   | lekes@komangs.com               |
| Denise Tripp     | Hydrogeologist                                   | Geosyntec             | Dtripp@geosyntec.com            |
| Spence Smith     | PM   | Jacobs                | Spence.Smith@jacobs.com         |
| Jerry Lanier     | PM   | Test America Savannah | Jerry.lanier@testamericainc.com |
| Penelope Reddy   | PM   | USACE                 | Penelope.Reddy@usace.army.mil   |
| Yixian Zhang     | Project Chemist                                  | USACE                 | Yixian.Zhang@usace.army.mil     |
| Robert Simeone   | BRAC Environmental Coordinator                   | US Army               | robert.j.simeone.civ@mail.mil   |
| Carol Keating    | Remedial PM                                      | USEPA Region I        | Keating.Carol@epa.gov           |
| David Chaffin    | Federal Sites Program                            | MassDEP               | David.Chaffin@state.ma.us       |

## QAPP WORKSHEET #4, 7 & 8: PERSONNEL TRAINING, RESPONSIBILITIES AND SIGN-OFF SHEET

### ORGANIZATION: KGS

| Name             | Project Title     | Specialized Training/Certifications   | Responsibilities  | Signature/Date |
|------------------|-------------------|---|---|----------------|
| Mark Applebee    | Program Manager   | Project Management Professional (PMP), Hazardous Waste Operations and Emergency Response (HAZWOPER) 40-hour Training; 8-Hour Refresher; CPR and first aid/AED | Oversight responsibility for contractual and technical performance.   |                |
| James Ropp       | Project Manager   | Licensed Professional Engineer (PE), HAZWOPER 40-hour Training; 8-Hour Refresher; CPR and first aid/AED   | Manages project technical and contractual requirements; coordinates between senior management, USACE, stakeholders, and project staff.  |                |
| Katherine Thomas | Technical Lead    | PMP, HAZWOPER 40-hour Training; 8-Hour Refresher; CPR and first aid/AED   | Manages remedial investigation technical task requirements; supports coordination at all levels.  |                |
| Kevin Anderson   | Field Team Leader | HAZWOPER 40-hour Training; 8-Hour Refresher; CPR and first aid/AED  | Supervises field sampling and coordinates all field activities; serves as the site KGS coordinator.   |                |
| Laurie Ekes      | Project Chemist   | HAZWOPER 40-hour Training; 8-Hour Refresher; CPR and first aid/AED  | Verifies that the UFP-QAPP analytical requirements are met by the laboratory and field staff. Also provides direction regarding requirements for corrective actions for field and analytical issues; evaluates and releases validated analytical results to the KGS project team. |                |

### QAPP WORKSHEET #4, 7 AND 8 - Continued

**ORGANIZATION:** Army/USACE

| Name           | Project Title                  | Specialized Training/Certifications         | Responsibilities  | Signature/Date |
|----------------|--------------------------------|---|---|----------------|
| Robert Simeone | BRAC Environmental Coordinator |   | BRAC Environmental Coordinator for Devens Environmental Remediation.                |                |
| Penelope Reddy | Technical Lead                 |   | USACE PM for Devens Environmental Remediation                                       |                |
| Yixian Zhang   | Project Chemist                | HAZWOPER 40-hour Training; 8-Hour Refresher | Coordinates with KGS project chemist. Reviews field activities and laboratory data. |                |

**ORGANIZATION:** Test America, Savannah

| Name         | Project Title   | Specialized Training/Certifications | Responsibilities   | Signature/Date |
|--------------|-----------------|-------------------------------------|--|----------------|
| Jerry Lanier | Project Manager | Not applicable                      | Primary point of contact for Test America Laboratory. Receives direction from KGS Project Chemist. Responsible for ensuring the UFP-QAPP requirements are met by the laboratory. |                |

**ORGANIZATION:** Test America, Sacramento

| Name         | Project Title                  | Specialized Training/Certifications | Responsibilities  | Signature/Date |
|--------------|--------------------------------|-------------------------------------|---|----------------|
| Debby Wilson | Client Services Manager (PFAS) | Not applicable                      | Manages client services for TestAmerica Laboratories, Sacramento. |                |

**QAPP WORKSHEET #4, 7 AND 8 - Continued**

**ORGANIZATION:** Alpha Analytical

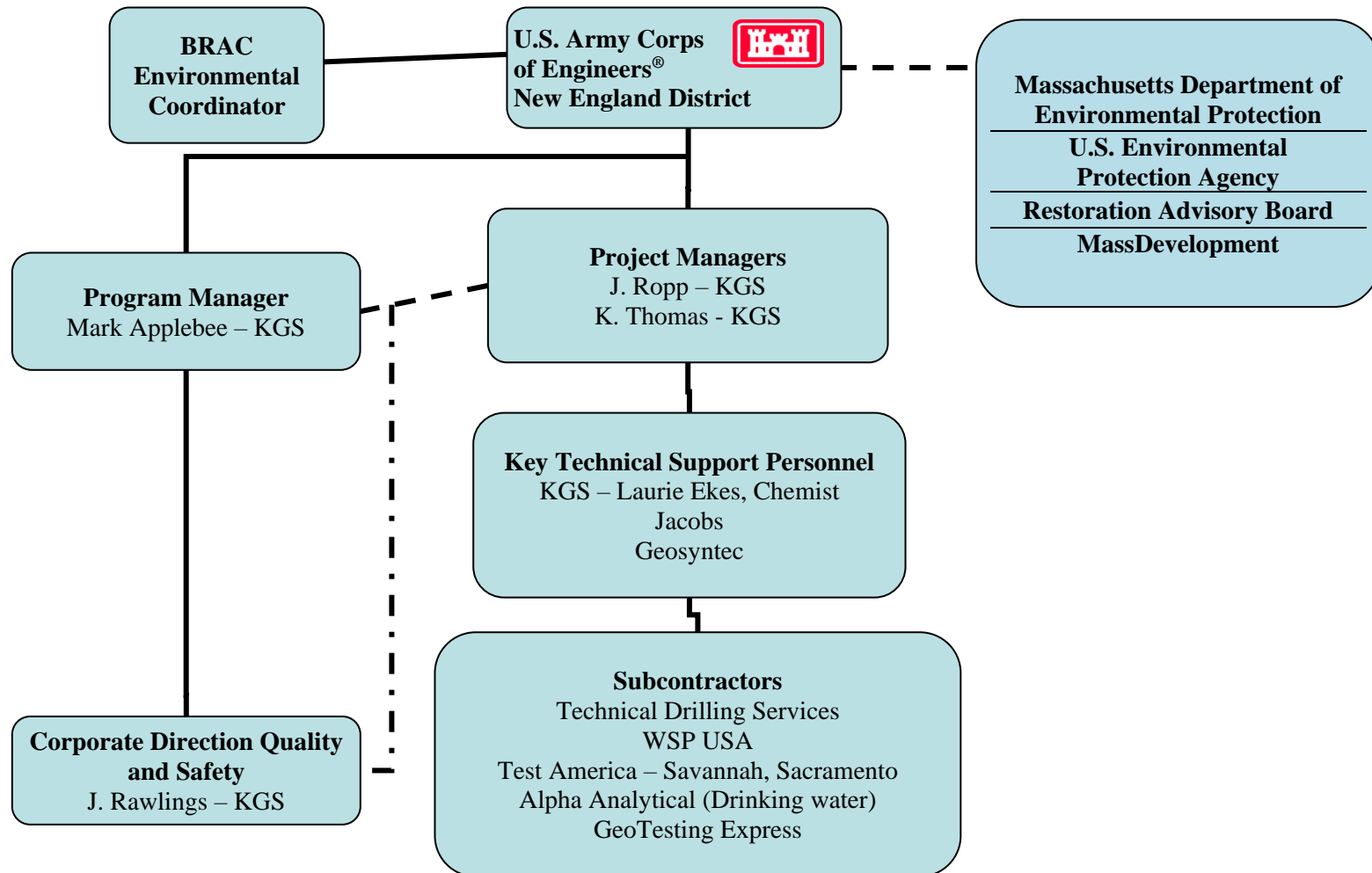
| <b>Name</b>    | <b>Project Title</b> | <b>Specialized<br/>Training/Certifications</b> | <b>Responsibilities</b>                       | <b>Signature/Date</b> |
|----------------|----------------------|--|---|-----------------------|
| Jim Occhialini |                      | Not applicable                                 | Manages client services for Alpha Analytical. |                       |

**ORGANIZATION:** GeoTesting Express

| <b>Name</b> | <b>Project Title</b> | <b>Specialized<br/>Training/Certifications</b> | <b>Responsibilities</b>   | <b>Signature/Date</b> |
|-------------|----------------------|--|---|-----------------------|
| Mark Dobday | Laboratory Manager   | Not applicable                                 | Primary point of contact for GeoTesting Express. Receives direction from KGS Project Chemist. Responsible for ensuring the UFP-QAPP requirements are met by the laboratory for grain size analysis. |                       |

Signatures indicate personnel have read and agree to implement this QAPP as written

## QAPP WORKSHEET #5: PROJECT ORGANIZATIONAL CHART



## QAPP WORKSHEET #6: COMMUNICATION PATHWAYS

| Communication Drivers                  | Responsible Entity                                    | Name             | Phone Number   | Procedure (Timing, Pathways, etc.)  |
|--|---|------------------|----------------|---|
| Communication with USACE (lead agency) | USACE Program Manager                                 | Penelope Reddy   | (978) 318-8160 | Primary point of contact with USACE. Coordinates contracting actions. Provides direction to KGS.  |
| Communication with BRAC                | BRAC EC   | Robert Simeone   | (978) 796-2205 | Primary point of contact for Fort Devens.   |
| Communication with EPA                 | EPA RPM   | Carol Keating    | (617) 918-1393 | Primary point of contact for EPA. Provides technical and regulatory input and recommendations to USACE.   |
| Communication with MassDEP             | MassDEP RPM   | David Chaffin    | (617) 348-4005 | Primary point of contact for MassDEP. Provides technical and regulatory input and recommendations.  |
| Communication with KGS                 | KGS PM  | James Ropp       | (603) 395-7986 | Primary point of contact for KGS. Provides project management input and recommendation to USACE PM. Receives direction from USACE.  |
| Secondary point of contact for KGS     | KGS Technical Lead                                    | Katherine Thomas | (774) 273-1467 | Primary point of contact for technical tasks; provides technical input and recommendations to UACE. Receives technical direction from USACE; provides input to KGS PM and project team on project status. |
| Progress of field program              | KGS   | Kevin Anderson   | (508) 366-7442 | Conveys progress of field activities. Communication with KGS technical lead. Oversees onsite safety activities.   |
| Communication with KGS Project Chemist | Test America (TA) Savannah Laboratory Project Manager | Jerry Lanier     | (912) 354-7858 | Coordinates laboratory staff to assure timely deliverables. Communicates QA/QC issues with project chemist. Approves release of analytical data from laboratory.  |
|  | TA Sacramento Laboratory Project Manager              | Debby Wilson     | (949) 260-3228 |   |
|  | Alpha Analytical                                      | Jim Occhialini   | (508) 898-9220 | PFAS drinking water sample laboratory coordination.   |
|  | GeoTesting Express Laboratory manager                 | Mark Dobday      | (978) 635-0424 | Coordinates lab staff and approves release of grain size analysis   |

### QAPP Worksheet #6 - Continued

| <b>Communication Drivers</b>          | <b>Responsible Entity</b> | <b>Name</b> | <b>Phone Number</b> | <b>Procedure<br/>(Timing, Pathways, etc.)</b>   |
|---------------------------------------|---------------------------|-------------|---------------------|---|
| Review and release of analytical data | KGS Project Chemist       | Laurie Ekes | (508) 366-7442      | Verifies the UFP_QAPP analytical requirements are met by the laboratory and field staff. Coordinates sampling activities with analytical laboratory. Evaluates and releases analytical results to the KGS PM. |



## **QAPP WORKSHEET #11: DATA QUALITY OBJECTIVES**

### **Step 1: State the Problem**

PFAS have been detected in groundwater, surface water, soil, and sediment at multiple Fort Devens AOCs at concentrations that may impact human health and the environment.

### **Step 2: Identify the Study Goals, Questions and Decision Statements**

#### Study Goals

Site characterization data are needed to define the nature and extent of PFAS at Fort Devens and downgradient of Fort Devens in groundwater and determine migration flow paths to evaluate current and potential impacts to public and private drinking water supply wells and surface water discharge areas.

Site characterization data are needed to identify sources of PFAS in soil at Fort Devens, either currently known sources or newly identified potential sources determined through the investigation, contributing to PFAS in groundwater and characterize the nature and extent of those sources including evaluation of sources in soil as potential continuing sources.

Additional data are also needed to support a quantitative human health risk assessment and an ecological risk evaluation, which will be completed to estimate potential human health and ecological risk from exposure to PFAS in groundwater, soil, surface water, and sediment.

#### Principle Study Questions and Associated Decision Statements:

- Are the PFAS detected at AOCs 32/43, 57, 74, and 75 impacting the Grove Pond water supply wells?
  - Decision Statement: Determine nature and extent of PFAS in groundwater impacting the Grove Pond water supply wells, nature and extent of PFAS in groundwater attributable to each AOC, hydraulic characteristics of the aquifer, groundwater flow directions, fate and transport of PFAS in the aquifer, and evaluate PFAS distribution using lines of evidence including ratios of select PFAS compounds.
- Are the PFAS detected in groundwater at AOCs 5, 20, 21, 32/43, and 76, impacting the MacPherson supply well?
  - Decision Statement: Determine nature and extent of PFAS in groundwater impacting the MacPherson supply well, nature and extent of PFAS in groundwater attributable to each AOC, hydraulic characteristics of the aquifer, groundwater flow directions, fate and transport of PFAS in the aquifer, evaluate PFAS distribution using lines of evidence including ratios of select PFAS compounds.
- What is the predicted impact of AOCs to water supply wells over time?
  - Decision Statement: Determine nature and extent of PFAS in groundwater attributable to each AOC, hydraulic characteristics of the aquifer, groundwater flow directions, fate and transport of PFAS in the aquifer to estimate velocity of contaminant transport and travel times), nature and extent of PFAS in soil, fate and

transport of PFAS from soil to groundwater, nature and extent of precursors in soil and groundwater, and evaluate potential for precursors to transform.

- Do other sources of PFAS exist that impact the Grove Pond and MacPherson supply wells?
  - Decision Statement: Determine nature and extent of PFAS in groundwater impacting the Grove Pond and MacPherson water supply wells, groundwater flow directions, evaluate PFAS distribution using lines of evidence including ratios of select PFAS compounds.
- Are there any other water supply wells that are potentially impacted by PFAS originating from Fort Devens?
  - Decision Statement: Determine nature and extent of PFAS associated with the AOCs, hydraulic characteristics of the aquifer, groundwater flow directions, fate and transport of PFAS in the aquifer, identify other water supply wells and associated construction information through research of appropriate public records and interviews, and sampling of other water supply wells, if appropriate.
- Are the PFAS detected in groundwater attributable to identified AOC source areas?
  - Decision Statement: Determine if PFAS in groundwater exists up gradient or cross gradient of the AOC source, hydraulic characteristics of the aquifer, groundwater flow directions, fate and transport of PFAS in the aquifer, and evaluate PFAS distribution using lines of evidence including ratios of select PFAS compounds.
- Are the PFAS detected in groundwater discharging to surface water bodies at concentrations that may pose a risk to human health and the environment?
  - Decision Statement: Determine PFAS concentrations in surface water and sediment where groundwater contaminated with PFAS is anticipated to discharge, human health and ecological risk from PFAS in surface water and sediment, hydraulic flow paths from the groundwater to the surface water, hydraulic characteristics of the aquifer, fate and transport of PFAS in the aquifer, and PFAS concentrations in groundwater discharging to surface water bodies.
- Are the PFAS detected in soil at concentration that may pose a risk to human health?
  - Decision Statement: Determine nature and extent of PFAS in soil and determine the human health risk from exposure to soil.
- Do PFAS concentrations in groundwater pose an unacceptable risk to human health?
  - Decision Statement: Determine nature and extent of PFAS in groundwater and human health risk from exposure to groundwater.
- Do PFAS concentrations in soil represent a significant continuing source impacting groundwater at concentrations that pose an unacceptable human health risk?
  - Decision Statement: Determine nature and extent of PFAS in soil, fate and transport of PFAS in soil to groundwater, nature and extent of PFAS concentrations in groundwater, hydraulic characteristics of the aquifer, groundwater flow direction,

fate and transport of PFAS in the aquifer, point of human exposure to groundwater, and human health risk via a complete exposure pathway.

### **Step 3: Identify Information Inputs**

Information inputs include historical data gathered on the sites and analytical data collected during the investigation. PFAS concentrations in water samples collected from existing and new monitoring wells, vertical profile borings, and private and public water supply wells used for drinking water. PFAS concentrations in soil samples collected from the ground surface and soil borings. PFAS concentrations in surface water and sediment samples collected from potentially impacted water bodies. Organic carbon in soil and water collected from soil borings and existing and new monitoring wells. Inputs include the site-specific screening levels and detection level objectives as defined in Worksheet #15.

Grain size analysis of soil and sediment samples. Lithologic characterization of aquifer materials. Hydraulic conductivity test after installation of monitoring wells at select locations. Groundwater level measurements after installation of monitoring wells and/or piezometers. An inventory of water supply wells.

### **Step 4: Define the Boundaries of the Study**

Each Area-specific Field Sampling Plan (FSP) addenda specifies drilling and sampling locations. Additional drilling and/or sampling locations may be added to the investigation based on initial investigation results and area-specific objectives.

### **Step 5: Develop the Analytic Approach**

If data from this investigation are sufficient to adequately characterize the nature and extent of PFAS in groundwater, to determine all PFAS migration pathways, to assess the fate and transport of PFAS, to assess water supply impacts, and to adequately assess human health risk then additional data will not be collected. EPA Lifetime Health Advisories (LHA), site-specific screening levels (SSSL), EPA Regional Screening Levels (RSL), and/or appropriate MassDEP guidance will be used for comparison purposes to assess the adequacy of the data. If significant data gaps are identified, then further data will be collected.

If data from this investigation are sufficient to adequately characterize the nature and extent of PFAS in soils, surface water, and sediment and to adequately assess human health risk and conduct an ecological risk evaluation, then additional data will not be collected. If significant data gaps are identified, then further data will be collected.

Soil and groundwater containing PFAS at concentrations greater than EPA LHA, SSSLs, and/or EPA RSLs, will be evaluated for potential risk to human health. If no unacceptable risk is identified, then no further action will be recommended for soil and/or groundwater. If a CERCLA human health risk assessment indicates unacceptable risk to human health, then a feasibility study will be conducted.

Surface water and sediment containing PFAS, will be evaluated for potential risk to human health. If no unacceptable risk is identified, then no further action will be recommended for surface water and/or sediment. If a CERCLA human health risk assessment indicates unacceptable risk to human health, then a feasibility study will be conducted.

If a complete exposure pathway for ecological receptors to PFAS, is identified, then a qualitative ecological risk evaluation will be completed. PFAS data will be compared to latest ecotoxicology values presented in scientific literature and in accordance with Army Guidance (Department of the Army, 2018). If an unacceptable risk to ecological risk is identified, further evaluation will be conducted.

#### **Step 6: Specify Performance or Acceptance Criteria**

Analytical data performance criteria/data quality indicators are specified in QAPP Worksheet #12. These data quality indicators include indicators (performance criteria) for precision, accuracy/bias, sensitivity, and completeness. To determine whether the detection limits (DL), limits of detection (LOD), and limits of quantitation (LOQ) will meet the analytical DQOs, the DLs, LODs, and LOQs have been compared to the project-specific screening criteria in Worksheet #15. With respect to data verification, validation, and usability: QAPP Worksheet #34 provides Data Verification and Validation Inputs; QAPP Worksheet #35 provides Data Verification Procedures; QAPP Worksheet #36 provides Data Validation Procedures; and QAPP Worksheet #37 provides Data Usability Assessment.

#### **Step 7: Develop the Detailed Plan for Obtaining Data**

The sampling design and rationale was developed for each area of investigation and is presented in each Area-specific FSP Addendum.

## **QAPP WORKSHEET #15: REFERENCE LIMITS AND EVALUATION TABLE**

One of the primary goals of the project-specific UFP-QAPP is to select appropriate analytical methods to achieve detection limits (DL), limits of detection (LOD), and/or limits of quantitation (LOQ) that will satisfy the overall project DQOs (as defined in Worksheets # 10 [Conceptual Site Model] and #11 [Data Quality Objectives]).

Groundwater and soil samples will be collected and submitted for PFAS analysis by “modified” method 537 (LC/MS/MS isotope dilution) compliant with QSM 5.1, Table B-15. Groundwater and soil samples from select locations will be processed by the laboratory through a total oxidizable precursor (TOP) assay. The TOP assay converts polyfluorinated precursors into fully fluorinated compounds (PFOS and PFOA) using a hydroxyl radical-based chemical oxidation method. The TOP assay replicates what micro-organisms in the environment would achieve after many years. Aqueous and soil samples that are oxidized via the TOP assay will have two sets of sample data reported, which will be designated pre-TOP and Post-TOP. The difference between PFAS concentrations before (Pre-TOP) and after (Post-TOP) oxidation can be used to estimate the concentration of the non-discrete oxidizable precursors in the sample. Select samples will also be submitted for organic carbon analysis, total organic carbon (TOC) for soil samples and dissolved organic carbon (DOC) for aqueous samples.

Worksheets #15-1a and #15-1b list the analytical method DLs, LODs, and LOQs for the target PFAS in aqueous samples and worksheets #15-2a and #15-2b list the analytical method DLs, LODs, and LOQs for the target PFAS in solid samples. Worksheets #15-1b and #15-2b list the respective DLs, LODs, and LOQs for post-TOP aqueous and soil samples. Slightly higher DLs, LODs and LOQs are reported for post-TOP samples due to the limited sample volume processed through the TOP assay.

Worksheets #15-1 and #15-2 show the LHA levels and SSSLs for PFAS with respect to the current analytical DL, LOD, and LOQ for each listed target compound. In all cases the expected detection levels are below the applicable LHAs, SSSLs and soil standards. If the LOD or the DL is below the screening criterion, the LOD and/or the LOQ are sufficient for quantitative use in a risk assessment.

Note that sample dilution because of target and or non-target compound concentrations or matrix interference may prevent DLs, LODs, or LOQs from being achieved. The samples must be initially analyzed undiluted when reasonable. If a dilution is necessary, both the original and diluted result must be delivered. Samples that are not analyzed undiluted must be supported by matrix interference documentation such as sample viscosity, color, odor, or results from other analyses of the same sample to show that an undiluted sample is not possible.

Worksheet #15-3 lists the analytical method DLs, LODs, and LOQs for target PFAS in drinking water samples, which will be analyzed by the drinking water method 537 Revision 1.1.

Worksheet #15-4 lists the DLs, LODs, or LOQs for DOC in aqueous samples and TOC in soil.

**QAPP WORKSHEET #15-1A: ANALYTICAL METHOD REPORTING LIMITS AND CONTROL LIMITS**

| Analytical Method <sup>1</sup>   | CAS Number | PFAS Compound  | Project Action Limit (ng/L) | Project Action Limit Reference <sup>2</sup> | LOQ (ng/L) | LOD (ng/L) | DL (ng/L) | Control Limits (LCS, MS, MSD) |     | Precision (RPD, %) |
|----------------------------------|------------|--|-----------------------------|---|------------|------------|-----------|-------------------------------|-----|--------------------|
| <b>Groundwater/Surface Water</b> | 2058-94-8  | Perfluoroundecanoic acid (PFUnA)                           | NA                          | --  | 2.00       | 1.50       | 0.72      | 76                            | 105 | 30                 |
| Direct Analysis/Pre-TOP Assay    | 375-73-5   | Perfluorobutanesulfonic acid (PFBS)                        | 40,100                      | EPA   | 2.00       | 1.00       | 0.46      | 87                            | 120 | 30                 |
| PFAS Analysis by LC/MS/MS        | 335-76-2   | Perfluorodecanoic acid (PFDA)                              | NA                          | --  | 2.00       | 1.00       | 0.48      | 85                            | 113 | 30                 |
| Isotope Dilution Method          | 307-55-1   | Perfluorododecanoic acid (PFDoA)                           | NA                          | --  | 2.00       | 1.50       | 0.52      | 87                            | 116 | 30                 |
|                                  | 375-85-9   | Perfluoroheptanoic acid (PFHpA)                            | NA                          | --  | 2.00       | 1.50       | 0.61      | 80                            | 113 | 30                 |
|                                  | 355-46-4   | Perfluorohexanesulfonic acid (PFHxS)                       | NA                          | --  | 2.00       | 1.00       | 0.38      | 81                            | 106 | 30                 |
|                                  | 307-24-4   | Perfluorohexanoic acid (PFHxA)                             | NA                          | --  | 2.00       | 1.00       | 0.47      | 83                            | 109 | 30                 |
|                                  | 375-95-1   | Perfluorononanoic acid (PFNA)                              | NA                          | --  | 2.00       | 1.50       | 0.52      | 83                            | 113 | 30                 |
|                                  | 1763-23-1  | Perfluorooctanesulfonic acid (PFOS)                        | 70/40.1                     | LHA/EPA                                     | 4.00       | 3.00       | 1.10      | 82                            | 112 | 30                 |
|                                  | 335-67-1   | Perfluorooctanoic acid (PFOA)                              | 70/40.1                     | LHA/EPA                                     | 2.00       | 1.50       | 0.54      | 80                            | 107 | 30                 |
|                                  | 72629-94-8 | Perfluorotridecanoic Acid (PFTriA)                         | NA                          | --  | 4.00       | 3.00       | 0.76      | 75                            | 129 | 30                 |
|                                  | 376-06-7   | Perfluorotetradecanoic acid (PFTeA)                        | NA                          | --  | 4.00       | 3.00       | 0.83      | 82                            | 115 | 30                 |
|                                  | 2991-50-6  | N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)  | NA                          | --  | 20.0       | 10.0       | 2.80      | 80                            | 109 | 30                 |
|                                  | 2355-31-9  | N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA) | NA                          | --  | 20.0       | 10.0       | 3.00      | 82                            | 111 | 30                 |
|                                  | 27619-97-2 | 1H, 1H, 2H, 2H-perfluorooctane sulfonate (6:2 FTS)         | NA                          | --  | 40.0       | 20.0       | 7.00      | 75                            | 118 | 30                 |
|                                  | 39108-34-4 | 1H, 1H, 2H, 2H-perfluoroeane sulfonate (8:2 FTS)           | NA                          | --  | 20.0       | 10.0       | 3.00      | 83                            | 111 | 30                 |

**Source:** Test America Sacramento - March 25, 2018

<sup>1</sup> See Worksheet #23 for Analytical SOP References

<sup>2</sup> LHA - Federal Register; Vol.81 #101, May 2016

EPA - Region 1 Memorandum: Site-Specific Screening Levels for PFOA, PFOS, and PFBS for the Fort Devens NPL Site, 2/28/18.

## QAPP Worksheet #15-1A - Continued

### Notes:

NA = not available

PFAS = per- and polyfluoroalkyl substances

CAS = Chemical Abstract Service

LOQ = limit of quantitation

LOD = limit of detection

LCS = laboratory control sample

DL = detection limit

MS = Matrix Spike

MSD = matrix spike

ng/L = nanogram per liter

RPD = relative percent difference

**QAPP WORKSHEET #15-1B: ANALYTICAL METHOD REPORTING LIMITS AND CONTROL LIMITS**

| <b>Analytical Method<sup>1</sup></b> | <b>CAS Number</b> | <b>PFAS Compound</b>                                       | <b>Project Action Limit (ng/L)</b> | <b>Project Action Limit Reference<sup>2</sup></b> | <b>LOQ (ng/L)</b> | <b>LOD (ng/L)</b> | <b>DL (ng/L)</b> | <b>Control Limits (LCS, MS, MSD)</b> |     | <b>Precision (RPD, %)</b> |
|--------------------------------------|-------------------|--|------------------------------------|---|-------------------|-------------------|------------------|--------------------------------------|-----|---------------------------|
| <b>Groundwater/Surface Water</b>     | 2058-94-8         | Perfluoroundecanoic acid (PFUnA)                           | NA                                 | --  | 5.00              | 3.75              | 2.80             | 57                                   | 117 | 30                        |
| Post-TOP Assay                       | 375-73-5          | Perfluorobutanesulfonic acid (PFBS)                        | 40,100                             | EPA   | 5.00              | 2.50              | 0.50             | 75                                   | 135 | 30                        |
| PFAS Analysis by LC/MS/MS            | 335-76-2          | Perfluorodecanoic acid (PFDA)                              | NA                                 | --  | 5.00              | 2.50              | 0.78             | 65                                   | 125 | 30                        |
| Isotope Dilution Method              | 307-55-1          | Perfluorododecanoic acid (PFDoA)                           | NA                                 | --  | 5.00              | 3.75              | 1.40             | 66                                   | 126 | 30                        |
|                                      | 375-85-9          | Perfluoroheptanoic acid (PFHpA)                            | NA                                 | --  | 5.00              | 3.75              | 0.63             | 104                                  | 171 | 30                        |
|                                      | 355-46-4          | Perfluorohexanesulfonic acid (PFHxS)                       | NA                                 | --  | 5.00              | 2.50              | 0.43             | 64                                   | 124 | 30                        |
|                                      | 307-24-4          | Perfluorohexanoic acid (PFHxA)                             | NA                                 | --  | 5.00              | 2.50              | 1.40             | 81                                   | 141 | 30                        |
|                                      | 375-95-1          | Perfluorononanoic acid (PFNA)                              | NA                                 | --  | 5.00              | 3.75              | 0.68             | 66                                   | 126 | 30                        |
|                                      | 1763-23-1         | Perfluorooctanesulfonic acid (PFOS)                        | 70/40.1                            | LHA/EPA   | 5.00              | 3.00              | 0.80             | 68                                   | 128 | 30                        |
|                                      | 335-67-1          | Perfluorooctanoic acid (PFOA)                              | 70/40.1                            | LHA/EPA   | 5.00              | 3.75              | 2.10             | 158                                  | 454 | 30                        |
|                                      | 72629-94-8        | Perfluorotridecanoic Acid (PFTriA)                         | NA                                 | --  | 5.00              | 3.50              | 3.20             | 65                                   | 136 | 30                        |
|                                      | 376-06-7          | Perfluorotetradecanoic acid (PFTeA)                        | NA                                 | --  | 5.00              | 3.00              | 0.73             | 63                                   | 123 | 30                        |
|                                      | 2991-50-6         | N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)  | NA                                 | --  | 50.0              | 12.5              | 7.80             | 0                                    | 10  | 30                        |
|                                      | 2355-31-9         | N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA) | NA                                 | --  | 50.0              | 12.5              | 4.80             | 0                                    | 10  | 30                        |
|                                      | 27619-97-2        | 1H, 1H, 2H, 2H-perfluorooctane sulfonate (6:2 FTS)         | NA                                 | --  | 50.0              | 12.5              | 5.00             | 0                                    | 10  | 30                        |
|                                      | 39108-34-4        | 1H, 1H, 2H, 2H-perfluoroeane sulfonate (8:2 FTS)           | NA                                 | --  | 50.0              | 12.5              | 5.00             | 0                                    | 10  | 30                        |

**Source:** Test America Sacramento - March 25, 2018

<sup>1</sup> See Worksheet #23 for Analytical SOP References

<sup>2</sup> LHA - Federal Register; Vol.81 #101, May 2016

EPA - Region 1 Memorandum: Site-Specific Screening Levels for PFOA, PFOS, and PFBS for the Fort Devens NPL Site, 2/28/18.



**Notes:**

NA = not available

PFAS = per- and polyfluoroalkyl substances

CAS = Chemical Abstract Service

LOQ = limit of quantitation

LOD = limit of detection

LCS = laboratory control sample

DL = detection limit

MS = Matrix Spike

MSD = matrix spike

ng/L = nanogram per liter

RPD = relative percent difference

**QAPP WORKSHEET #15-2A: ANALYTICAL METHOD REPORTING LIMITS AND CONTROL LIMITS**

| <b>Analytical Method<sup>1</sup></b> | <b>CAS Number</b> | <b>PFAS Compound</b>                 | <b>Project Action Limit (µg/Kg)</b> | <b>Project Action Limit Reference<sup>2</sup></b> | <b>LOQ (µg/Kg)</b> | <b>LOD (µg/Kg)</b> | <b>DL (µg/Kg)</b> | <b>Control Limits (LCS, MS, MSD)</b> |     | <b>Precision (RPD, %)</b> |
|--------------------------------------|-------------------|--------------------------------------|-------------------------------------|---|--------------------|--------------------|-------------------|--------------------------------------|-----|---------------------------|
| <b>Soil/Sediment</b>                 | 2058-94-8         | Perfluoroundecanoic acid (PFUnA)     | NA                                  | --  | 0.300              | 0.200              | 0.100             | 74                                   | 114 | 30                        |
| Direct Analysis/Pre-TOP Assay        | 375-73-5          | Perfluorobutanesulfonic acid (PFBS)  | 126,000/609,000                     | EPA Soil/Sediment                                 | 0.400              | 0.180              | 0.059             | 73                                   | 142 | 30                        |
| PFAS Analysis by LC/MS/MS            | 335-76-2          | Perfluorodecanoic acid (PFDA)        | NA                                  | --  | 0.300              | 0.200              | 0.089             | 74                                   | 124 | 30                        |
| Isotope Dilution Method              | 307-55-1          | Perfluorododecanoic acid (PFDoA)     | NA                                  | --  | 0.300              | 0.200              | 0.100             | 75                                   | 123 | 30                        |
|                                      | 375-85-9          | Perfluoroheptanoic acid (PFHpA)      | NA                                  | --  | 0.300              | 0.200              | 0.078             | 76                                   | 124 | 30                        |
|                                      | 355-46-4          | Perfluorohexanesulfonic acid (PFHxS) | NA                                  | --  | 0.300              | 0.200              | 0.062             | 75                                   | 121 | 30                        |
|                                      | 307-24-4          | Perfluorohexanoic acid (PFHxA)       | NA                                  | --  | 0.300              | 0.200              | 0.071             | 75                                   | 125 | 30                        |
|                                      | 375-95-1          | Perfluorononanoic acid (PFNA)        | NA                                  | --  | 0.300              | 0.200              | 0.081             | 74                                   | 126 | 30                        |
|                                      | 1763-23-1         | Perfluorooctanesulfonic acid (PFOS)  | 126/609                             | EPA Soil/Sediment                                 | 1.00               | 0.500              | 0.240             | 69                                   | 131 | 30                        |
|                                      | 335-67-1          | Perfluorooctanoic acid (PFOA)        | 126/609                             | EPA Soil/Sediment                                 | 0.300              | 0.200              | 0.100             | 76                                   | 121 | 30                        |
|                                      | 72629-94-8        | Perfluorotridecanoic Acid (PFTriA)   | NA                                  | --  | 0.300              | 0.200              | 0.100             | 43                                   | 116 | 30                        |
|                                      | 376-06-7          | Perfluorotetradecanoic acid (PFTeA)  | NA                                  | --  | 0.400              | 0.300              | 0.110             | 22                                   | 129 | 30                        |

### QAPP Worksheet #15-2A - Continued

| Analytical Method <sup>1</sup> | CAS Number | PFAS Compound  | Project Action Limit (µg/Kg) | Project Action Limit Reference <sup>2</sup> | LOQ (µg/Kg) | LOD (µg/Kg) | DL (µg/Kg) | Control Limits (LCS, MS, MSD) |     | Precision (RPD, %) |
|--------------------------------|------------|--|------------------------------|---|-------------|-------------|------------|-------------------------------|-----|--------------------|
|                                | 2991-50-6  | N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)  | NA                           | --  | 2.00        | 1.00        | 0.300      | 65                            | 135 | 30                 |
|                                | 2355-31-9  | N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA) | NA                           | --  | 2.00        | 1.00        | 0.300      | 65                            | 135 | 30                 |
|                                | 27619-97-2 | 1H, 1H, 2H, 2H-perfluorooctane sulfonate (6:2 FTS)         | NA                           | --  | 4.00        | 2.00        | 0.660      | 65                            | 135 | 30                 |
|                                | 39108-34-4 | 1H, 1H, 2H, 2H-perfluorooctane sulfonate (8:2 FTS)         | NA                           | --  | 2.00        | 1.00        | 0.300      | 65                            | 135 | 30                 |

**Source:** Test America Sacramento - March 25, 2018

<sup>1</sup> See Worksheet #23 for Analytical SOP References

EPA - Region 1 Memorandum: Site-Specific Screening Levels for PFOA, PFOS, and PFBS for the Fort Devens NPL Site, 2/28/18.

**Notes:**

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PFAS = per- and polyfluoroalkyl substances

CAS = Chemical Abstract Service

LOQ = limit of quantitation

LOD = limit of detection

LCS = laboratory control sample

MS = matrix spike

MSD = matrix spike duplicate

µg/Kg = microgram per kilogram

RPD = relative percent difference

DL = detection limit

## QAPP WORKSHEET #15-2B: ANALYTICAL METHOD REPORTING LIMITS AND CONTROL LIMITS

| Analytical Method <sup>1</sup> | CAS Number | PFAS Compound                        | Project Action Limit (µg/Kg) | Project Action Limit Reference <sup>2</sup> | LOQ (µg/Kg) | LOD (µg/Kg) | DL (µg/Kg) | Control Limits (LCS, MS, MSD) |     | Precision (RPD, %) |
|--------------------------------|------------|--------------------------------------|------------------------------|---|-------------|-------------|------------|-------------------------------|-----|--------------------|
| Soil                           | 2058-94-8  | Perfluoroundecanoic acid (PFUnA)     | NA                           | --  | 0.500       | 0.250       | 0.090      | 70                            | 130 | 30                 |
| Post-TOP Assay                 | 375-73-5   | Perfluorobutanesulfonic acid (PFBS)  | 126,000                      | EPA   | 0.500       | 0.250       | 0.063      | 70                            | 130 | 30                 |
| PFAS Analysis by LC/MS/MS      | 335-76-2   | Perfluorodecanoic acid (PFDA)        | NA                           | --  | 0.500       | 0.250       | 0.055      | 70                            | 130 | 30                 |
| Isotope Dilution Method        | 307-55-1   | Perfluorododecanoic acid (PFDoA)     | NA                           | --  | 0.500       | 0.250       | 0.170      | 70                            | 130 | 30                 |
|                                | 375-85-9   | Perfluoroheptanoic acid (PFHpA)      | NA                           | --  | 0.500       | 0.250       | 0.073      | 70                            | 130 | 30                 |
|                                | 355-46-4   | Perfluorohexanesulfonic acid (PFHxS) | NA                           | --  | 0.500       | 0.250       | 0.078      | 70                            | 130 | 30                 |
|                                | 307-24-4   | Perfluorohexanoic acid (PFHxA)       | NA                           | --  | 0.500       | 0.250       | 0.110      | 70                            | 130 | 30                 |
|                                | 375-95-1   | Perfluorononanoic acid (PFNA)        | NA                           | --  | 0.500       | 0.250       | 0.090      | 70                            | 130 | 30                 |
|                                | 1763-23-1  | Perfluorooctanesulfonic acid (PFOS)  | 126                          | EPA   | 1.25        | 0.625       | 0.500      | 70                            | 130 | 30                 |
|                                | 335-67-1   | Perfluorooctanoic acid (PFOA)        | 126                          | EPA   | 0.500       | 0.250       | 0.220      | 70                            | 130 | 30                 |
|                                | 72629-94-8 | Perfluorotridecanoic Acid (PFTriA)   | NA                           | --  | 0.500       | 0.250       | 0.130      | 70                            | 130 | 30                 |
|                                | 376-06-7   | Perfluorotetradecanoic acid (PFTeA)  | NA                           | --  | 0.500       | 0.250       | 0.140      | 70                            | 130 | 30                 |

### QAPP Worksheet #15-2B - Continued

| Analytical Method <sup>1</sup> | CAS Number | PFAS Compound  | Project Action Limit (µg/Kg) | Project Action Limit Reference <sup>2</sup> | LOQ (µg/Kg) | LOD (µg/Kg) | DL (µg/Kg) | Control Limits (LCS, MS, MSD) |     | Precision (RPD, %) |
|--------------------------------|------------|--|------------------------------|---|-------------|-------------|------------|-------------------------------|-----|--------------------|
|                                | 2991-50-6  | N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)  | NA                           | --  | 5.00        | 2.50        | 0.930      | 70                            | 130 | 30                 |
|                                | 2355-31-9  | N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA) | NA                           | --  | 5.00        | 2.50        | 0.980      | 70                            | 130 | 30                 |
|                                | 27619-97-2 | 1H, 1H, 2H, 2H-perfluorooctane sulfonate (6:2 FTS)         | NA                           | --  | 5.00        | 2.50        | 0.380      | 70                            | 130 | 30                 |
|                                | 39108-34-4 | 1H, 1H, 2H, 2H-perfluoroeane sulfonate (8:2 FTS)           | NA                           | --  | 5.00        | 2.50        | 0.630      | 70                            | 130 | 30                 |

**Source:** Test America Sacramento - March 25, 2018

<sup>1</sup> See Worksheet #23 for Analytical SOP References

EPA - Region 1 Memorandum: Site-Specific Screening Levels for PFOA, PFOS, and PFBS for the Fort Devens NPL Site, 2/28/18.

**Notes:**

NA = not available

PFAS = per- and polyfluoroalkyl substances

CAS = Chemical Abstract Service

LOQ = limit of quantitation

LOD = limit of detection

LCS = laboratory control sample

MS = matrix spike

MSD = matrix spike

µg/Kg = microgram per kilogram

RPD = relative percent difference

DL = detection limit

**QAPP WORKSHEET #15-3: ANALYTICAL METHOD REPORTING LIMITS AND CONTROL LIMITS DRINKING WATER  
SAMPLES**

| <b>Analytical Method<sup>1</sup></b>         | <b>CAS<br/>Number</b> | <b>PFAS Compound</b>   | <b>Project<br/>Action<br/>Limit<br/>(ng/L)</b> | <b>Project<br/>Action<br/>Limit<br/>Reference<sup>2</sup></b> | <b>LOQ<br/>(ng/L)</b> | <b>LOD<br/>(ng/L)</b> | <b>DL<br/>(ng/L)</b> | <b>Control<br/>Limits (LCS,<br/>MS, MSD)</b> |     | <b>Precision<br/>(RPD, %)</b> |
|--|-----------------------|--|--|---|-----------------------|-----------------------|----------------------|--|-----|-------------------------------|
| <b>Drinking Water</b>                        | 2058-94-8             | Perfluoroundecanoic acid (PFUnA)                                 | NA   | --  | 2.00                  | 0.80                  | 0.218                | 70   | 130 | 30                            |
| PFAS Analysis by<br>LC/MS/MS                 | 375-73-5              | Perfluorobutanesulfonic acid (PFBS)                              | 40,100   | EPA   | 2.00                  | 1.6                   | 0.650                | 70   | 130 | 30                            |
| Drinking Water<br>Method 537<br>Revision 1.1 |                       |  |  | --  |                       |                       |                      |  |     |                               |
|  | 335-76-2              | Perfluorodecanoic acid (PFDA)                                    | NA   | --  | 2.00                  | 0.80                  | 0.288                | 70   | 130 | 30                            |
|  | 307-55-1              | Perfluorododecanoic acid (PFDoA)                                 | NA   | --  | 2.00                  | 0.80                  | 0.284                | 70   | 130 | 30                            |
|  | 375-85-9              | Perfluoroheptanoic acid (PFHpA)                                  | NA   | --  | 2.00                  | 0.80                  | 0.238                | 70   | 130 | 30                            |
|  | 355-46-4              | Perfluorohexanesulfonic acid<br>(PFHxS)                          | NA   | --  | 2.00                  | 0.80                  | 0.328                | 70   | 130 | 30                            |
|  | 307-24-4              | Perfluorohexanoic acid (PFHxA)                                   | NA   | --  | 2.00                  | 1.6                   | 0.404                | 70   | 130 | 30                            |
|  | 375-95-1              | Perfluorononanoic acid (PFNA)                                    | NA   | --  | 2.00                  | 0.80                  | 0.257                | 70   | 130 | 30                            |
|  | 1763-23-1             | Perfluorooctanesulfonic acid (PFOS)                              | 70/40.1  | LHA/EPA   | 2.00                  | 0.80                  | 0.225                | 70   | 130 | 30                            |
|  | 335-67-1              | Perfluorooctanoic acid (PFOA)                                    | 70/40.1  | LHA/EPA   | 2.00                  | 0.80                  | 0.261                | 70   | 130 | 30                            |
|  | 72629-94-8            | Perfluorotridecanoic Acid (PFTriA)                               | NA   | --  | 2.00                  | 1.6                   | 0.576                | 70   | 130 | 30                            |
|  | 376-06-7              | Perfluorotetradecanoic acid (PFTeA)                              | NA   | --  | 2.00                  | 1.6                   | 0.515                | 70   | 130 | 30                            |
|  | 2991-50-6             | N-ethyl perfluorooctane<br>sulfonamidoacetic acid<br>(NEtFOSAA)  | NA   | --  | 2.00                  | 1.6                   | 0.595                | 70   | 130 | 30                            |
|  | 2355-31-9             | N-methyl perfluorooctane<br>sulfonamidoacetic acid<br>(NMeFOSAA) | NA   | --  | 2.00                  | 1.6                   | 0.636                | 70   | 130 | 30                            |

**Source:** Alpha Analytical, June 2018

<sup>1</sup> See Worksheet #23 for Analytical SOP References

<sup>2</sup> LHA - Federal Register; Vol.81 #101, May 2016

EPA - Region 1 Memorandum: Site-Specific Screening Levels for PFOA, PFOS, and PFBS for the Fort Devens NPL Site, 2/28/18.

**Notes:**

NA = not available

PFAS = per- and polyfluoroalkyl substances

CAS = Chemical Abstract Service

LOQ = limit of quantitation

LCS = laboratory control sample

MS = matrix spike

MSD = matrix spike duplicate

ng/L = nanogram per liter

DL = detection limit

LOD = limit of detection

RPD = relative percent difference

## QAPP WORKSHEET #15-4: ANALYTICAL METHOD REPORTING LIMITS AND CONTROL LIMITS

| Analytical Method <sup>1</sup>  | CAS Number | PFAS Compound                  | Project Action Limit | LOQ   | LOD  | DL   | Units | Control Limits (LCS, MS, MSD) |     | Precision (RPD, %) |
|---------------------------------|------------|--------------------------------|----------------------|-------|------|------|-------|-------------------------------|-----|--------------------|
| Groundwater/Surface Water       |            |                                |                      |       |      |      |       |                               |     |                    |
| DOC analysis in aqueous samples | 7440-44-0  | Dissolved Organic Carbon (DOC) | NA                   | 1.0   | 0.50 | 0.19 | mg/L  | 88                            | 112 | 20                 |
| Soil/Sediment                   |            |                                |                      |       |      |      |       |                               |     |                    |
| TOC analysis in soil samples    | 7440-44-0  | Total Organic Carbon (TOC)     | NA                   | 2,000 | 100  | 44.4 | mg/Kg | 50                            | 140 | 35                 |

**Source:** Test America Sacramento - March 25, 2018

<sup>1</sup> See Worksheet #23 for Analytical SOP References

<sup>2</sup> LHA - Federal Register; Vol.81 #101, May 2016

EPA - Region 1 Memorandum: Site-Specific Screening Levels for PFOA, PFOS, and PFBS for the Fort Devens NPL Site, 2/28/18.

**Notes:**

NA = not available

PFAS = per- and polyfluoroalkyl substances

CAS = Chemical Abstract Service

LOQ = limit of quantitation

LOD = limit of detection

LCS = laboratory control sample

MS = matrix spike

MSD = matrix spike duplicate

mg/Kg = milligram per kilogram

mg/L = milligram per Liter

DL = detection limit

RPD = relative percent difference



## **QAPP WORKSHEET #17: SAMPLING DESIGN AND RATIONALE**

### **Sampling Design and Rationale**

The sampling and analysis will be completed to gather the data to achieve the DQOs (Worksheet #11). The design of the sampling program and rationale for the areas of investigation is presented in each Area-specific FSP Addendum. If further investigation is warranted after receiving and reviewing results, the field program may be expanded to include the sampling of additional existing monitoring wells, the collection of samples from new groundwater vertical profile borings and/or soil boring, and/or installation of new monitoring wells.

### **Field Activities**

Groundwater from monitoring wells will be purged and sampled in accordance with the Region 1, Low Stress (low flow) Purging and Sampling Procedure for the Collection of Ground Water Samples from Monitoring Wells (USEPA Region 1, 2017) and KGS-SOP-F003 (Groundwater Sampling). Water quality parameters will be recorded for dissolved oxygen, specific conductance, oxidation-reduction potential, temperature, pH, and turbidity in accordance with KGS-SOP-F003. Prior to sampling, each well condition will be evaluated and depth to water measurement recorded in accordance with KGS-SOP-F002 (Evaluation of Existing Monitoring Wells and Water Level Measurement). Samples will be collected from each residential, water supply well or extraction well port in accordance with KGS-SOP-F016 (Private and Water Supply Well Sampling). The stringent sampling procedures required for PFAS sampling are detailed in the KGS-SOP-F009 (PFAS Sampling). Surface water and sediment samples will be collected in accordance with KGS-SOP-F004 (Sediment-Surface Water Sampling). Shallow and surface soil samples will be collected in accordance with KGS-SOP-F015 (Soil Sampling – Surface and Shallow Depth). Samples collected will be handled in accordance with KGS-SOP-F008 (Sample Handling). Equipment will be decontaminated in accordance with KGS-SOP-F005 (Decontamination of Field Equipment). Field activities using direct push technology, vertical profiling and some soil sampling, will be conducted in accordance with KGS-SOP-F012 (Direct Push Technology). Monitoring wells will be construction and developed in accordance with KGS-SOP-F017 (Monitoring Well Construction and Development). Soils will be described in accordance with KGS-SOP-F018 (Soil Description). Samples will be analyzed for the analyses listed in the Area-specific FSP addendum for each media.

### **Vertical Profiling**

Groundwater samples will be collected via vertical profiling using direct push technology. Temporary screens will be advanced using a Geoprobe® drill rig and SP22® groundwater sampler. Direct Push technology will be used to advance the SP22® sampler to the appropriate depth. Attachment A includes SOPs for the Geoprobe® SP22® sampling device. Temporary well groundwater samples shall be collected using the following procedure:

- Advance a 2.25-inch outer casing equipped with an expendable drive point into the appropriate depth using direct-push tooling and drill rig;
- Lower a 48-inch stainless steel screen to total depth inside the outer casing;

- Retract the outer casing to expel the expendable drive point and expose two feet of the screen;
- Measure the water level inserting a decontaminated electronic water level meter inside the inner rods and monitor the water level until it appears to stabilize;
- If necessary, the screen will be raised to coincide with the water table;
- Insert new high-density polyethylene tubing (HDPE) tubing into the screened interval to collect a groundwater sample via either a check valve sampling method or peristaltic pump;
- Measure field parameters and collect groundwater sample by filling sample containers directly from tubing;
- Remove tubing and direct-push tooling with screened-tip from the borehole and decontaminate equipment with Alconox or Liquinox and de-ionized water. Dispose of tubing.
- The process will be repeated for subsequent depths.

Where boreholes for soil sampling and groundwater sampling are collocated and as feasible, the borehole for the groundwater sample will be a continuation of the borehole used to collect the collocated shallow soil samples; otherwise, the groundwater sample borehole will be installed within 3 feet of the soil sample borehole.

As noted in Attachment A, most of the components of the Geoprobe® SP22® sampling device are comprised of stainless steel; however, several O-rings of unknown construction are depicted. Prior to sampling, the drilling subcontractor will be consulted regarding the O-ring material and its potential to cause false-positive PFAS detection in groundwater samples. If the potential for false positives is uncertain, then a field blank sample will be collected of PFAS free, de-ionized water run through the sampling device.

Boreholes will be abandoned after sample collection by filling the entire length of the borehole with cement-bentonite grout.

Groundwater sample collection will include using disposable non-Teflon tubing and pumps.

### **Sample Analysis**

Various analysis will be used including analysis for PFAS, TOC, DOC, grain size. Groundwater and soil samples from select locations will be processed by the laboratory through a total oxidizable precursor (TOP) assay. The total oxidizable precursor assay (TOP) converts polyfluorinated precursors into fully fluorinated compounds (PFOS and PFOA) using a hydroxyl radical-based chemical oxidation method. The TOP assay replicates what micro-organisms in the environment would achieve after many years. Two sets of sample results will be reported for these samples. The difference between PFAS concentrations before (Pre-TOP) and after (Post-TOP) oxidation can be used to estimate the concentration of the non-discrete oxidizable precursors in the sample. The results will allow evaluation of the total PFOS and PFOA mass in each sample through evaluation of the presence of PFOS and PFOA along with other PFAS compounds that

degrade into PFAS compounds including PFOS and PFOA. The results will be used in evaluation of potential continuing sources.

### **Sample Nomenclature**

The nomenclature for identifying locations, samples collected in the field, and quality assurance/quality control (QA/QC) samples is presented below.

#### **Location Identifier**

All new locations will be assigned a unique location identifier (ID), which will identify the specific point where measurements or samples are collected. Location IDs for new locations will be assigned prior to the sampling event. The location ID will include codes to identify the AOC or area of investigation, the location type, year established, and the location number.

The AOC or areas of investigation may be two- or three-characters and will be numbers or letters. Examples include “74” for AOC 74, “CSB” for Cold Spring Book, and “GP” for Grove Pond.

The location types are listed below.

SB – Soil Boring

VP – Vertical Profile

M – Monitoring Well

The year established will be indicated by two numerals, such as “18” to indicate 2018. The location number will be a unique sequential number for respective locations established within each AOC or area of investigation. The location ID for the second vertical profile conducted at AOC 75 in 2018 would be “75VP-18-02”.

Surface water and sediment locations will be assigned location IDs designating the area of investigation only. For example, the location ID for a surface water/sediment location established at Cold Spring Brook would be “CSB-18-01”.

#### **Field Sample ID**

A unique field sample ID will incorporate the location ID, described above, and will be used to identify individual field samples collected for a specific sampling event. The field sample ID will be used on sample labels, chain of custody forms, field logbooks, field sheets and other applicable documentation. The field sample IDs will include the location ID appended with a sample matrix code (for soil samples collected from monitoring well borings and surface water and sediment samples), and sample depth or sample date code (depending on the location type).

The sample matrix codes include:

SO – soil

SED – sediment

SW – surface water

A sample depth code will be used for soil samples and groundwater samples collected via vertical profiling. The depth will represent the depth interval of the sample with respect to feet below ground surface (ft bgs).

A sample date code (MONYY) will be used for groundwater samples collected from monitoring wells and for surface water and sediment samples to identify the sampling events and to aid in comparison of results from the same location. The sample date code will be represented by three letters representing the month and two digits representing the year the sample was collected.

The following are examples of field sampling IDs:

GPVP-18-02-25-27 represents a groundwater sample collected from the second 2018 vertical profile location at Grove Pond collected from 25 to 27 ft bgs.

75SB-18-01-0-0.5 represents a soil sample collected from the first 2018 soil boring location at AOC 75 collected from 0 to 0.5 ft bgs.

74M-19-02X-SO-55-56 represents a soil sample collected from 55 to 56 ft bgs during drilling for the second monitoring well installed at AOC 74 in 2019.

5701M-19-03-FEB19 represents a groundwater sample collected in February 2019 from the third 2019 monitoring well installed at AOC 57 Area 1.

CSB-18-04-SED-DEC18 represents a sediment sample collected in December 2018 from the fourth Cold Spring Brook location.

#### Field Quality Assurance/Quality Control Samples

Quality assurance/quality control (QA/QC) samples will be designated to indicate the type of QA/QC sample. The QA/QC sample IDs will include the AOC or area of investigation, location types or sample matrix, QA/QC sample type, and sequential numbering (01, 02, 03).

The QA/QC sample types will include the following and be identified as:

DUP – Field Duplicate

FRB – Field Reagent Blank

EB – Equipment Rinseate Blank

Field duplicate samples will include the AOC or area of investigation and the location type or sample matrix appended with DUP01, DUP02 etc. For example, the field sample ID for a field duplicate sample collected from soil boring location 74SB-18-01 would be “74SB-DUP01”. A field reagent blank sample associated with vertical profile samples from AOC 74 would be “74VP-FRB01”. Matrix spike and matrix spike duplicate samples (MS/MSD) will be identified in the notes of the chain of custody; the laboratory will append MS or MSD to the sample ID for reporting.

The specific location IDs and field sample IDs are presented in each Area-specific field sampling plan addendum.

#### **Investigation-Derived Waste Management**

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Investigation Derived Waste (IDW) will be handled in a manner consistent with USACE and EPA guidance for managing IDW and applicable Federal and state regulations. Waste soil generated from drilling activities will be containerized, characterized, and disposed. USACE may delegate authority to KGS via email for signature of manifest of non-hazardous waste. Signed manifest will be sent to the USACE upon signature and pick up of IDW. Any groundwater generated will be containerized and upon completion of sampling, discharged back to the ground at the site of generation. IDW will be managed in accordance with KGS-SOP-F011 (IDW Management).

## QAPP WORKSHEET #19 AND 30: SAMPLE CONTAINERS, PRESERVATION, AND HOLD TIMES

Worksheets #19 and #30 summarize the analytical methods/matrix, required sample volume, containers, preservation, and holding time requirements. Laboratory analytical SOPs are provided in Worksheet #23 (Analytical SOP). The primary point of contact is through the Test America-Savannah laboratory. PFAS groundwater, surface water, soil, and sediment samples will be analyzed at Test America-Sacramento and DOC/TOC samples will be analyzed at Test America-Seattle. PFAS drinking water samples will be analyzed at Alpha Analytical. Grain size samples will be submitted directly to GeoTesting Expresss in Acton, MA.

| <b>Primary Analytical Laboratory</b><br>Test America<br>Point of Contact: Jerry Lanier, Phone: (912) 354-7858 |                  |  |   |   |  |
|---|------------------|--|---|---|--|
| Matrix  | Analytical Group | Analytical / Preparation Method SOP Reference <sup>1</sup> | Containers (number, size, and type)               | Preservation Requirements (chemical, temperature)         | Maximum Holding Time <sup>2</sup> (preparation/analysis)                 |
| <b>ORGANIC ANALYSES</b>   |                  |  |   |   |  |
| Groundwater, Surface Water  | PFAS             | WS-LC-0025 Rev 3.0 (4/13/2018) (TAL-Sacramento)            | 2 x 250-ml HDPE Bottles (NO Teflon lids)          | Cool to 4 ± 2°C   | Extraction: 14 Days from Collection<br>Analysis: 40 days from Extraction |
| Sediment, Soil  | PFAS             | WS-LC-0025 Rev 3.0 (4/13/2018) (TAL-Sacramento)            | 1-4-ounce HDPE Jar                                | Cool to 4 ± 2°C   | Extraction: 14 Days from Collection<br>Analysis: 40 days from Extraction |
| Drinking Water  | PFAS             | SOP 23511, Revision 4 (6/29/2017) (Alpha Analytical)       | 2 C -250ml polypropylene Bottles (NO Teflon Lids) | Trizma®<br>Cool to 4 ± 2°C                                | Extraction: 14 Days from Collection<br>Analysis: 40 days from Extraction |
| <b>MISCELLANEOUS ANALYSES</b>   |                  |  |   |   |  |
| Groundwater, Surface Water  | DOC              | EPA 415.1, SW9060 SOP TA-WC-156 (TAL - Seattle)            | 1-500-ml Amber Glass                              | H <sub>3</sub> PO <sub>4</sub> to pH 2<br>Cool to 4 ± 2°C | 28 days from collection.   |
| Sediment, Soil  | TOC              | EPA 9060A SOP TA-WC-192 (TAL - Seattle)                    | 1-4-ounce glass jar                               | Cool to 4 ± 2°C   | 28 days from collection.   |



### QAPP Worksheets #19 and 30 - Continued

| <b>Primary Analytical Laboratory</b><br>Test America<br>Point of Contact: Jerry Lanier, Phone: (912) 354-7858 |                         |  |  |  |  |
|---|-------------------------|--|--|--|--|
| <b>Matrix</b>   | <b>Analytical Group</b> | <b>Analytical /<br/>Preparation Method<br/>SOP Reference<sup>1</sup></b> | <b>Containers<br/>(number, size, and<br/>type)</b> | <b>Preservation<br/>Requirements<br/>(chemical, temperature)</b> | <b>Maximum Holding Time<sup>2</sup><br/>(preparation/analysis)</b> |
| <b>MISCELLANEOUS ANALYSES</b>   |                         |  |  |  |  |
| Sediment, Soil  | Grain size              | ASTM D-422<br>SOP ASTM D-422-07<br>(GeoTesting Express)                  | 1-1-gallon ziplock<br>bag                          | Cool to $4 \pm 2^{\circ}\text{C}$                                | Not specified  |

<sup>1</sup> See Worksheet #23. Laboratory SOPs are provided in Attachment B.

<sup>2</sup> Maximum holding time is calculated from the time the sample is collected to the time the sample is prepared/extracted.

## QAPP WORKSHEET #20: FIELD QC SAMPLE SUMMARY

The table below provides a summary of the types of samples to be collected and analyzed. Its purpose is to show the relationship between the number of field samples and associated QC samples for each combination of analyte/analytical group and matrix. Area-specific sample locations are summarized in tables included in each Area-specific field sampling plan addendum.

| Matrix                        | Analysis <sup>1</sup> | Field Samples                  | Field Duplicates | Matrix Spikes | Matrix Spike Duplicates | Equipment Rinseate Blanks <sup>2</sup> | Field Reagent Blanks <sup>3</sup> |
|-------------------------------|-----------------------|--------------------------------|------------------|---------------|-------------------------|--|-----------------------------------|
| Groundwater<br>Drinking Water | PFAS                  | See Area-specific FSP addendum | 10%              | 5%            | 5%                      | One per piece of sampling equipment    | PFAS-free source water            |
| Surface Water                 | PFAS                  | See Area-specific FSP addendum | 10%              | 5%            | 5%                      | One per piece of sampling equipment    | PFAS-free source water            |
| Soil                          | PFAS                  | See Area-specific FSP addendum | 10%              | 5%            | 5%                      | One per piece of sampling equipment    | PFAS-free source water            |
| Sediment                      | PFAS                  | See Area-specific FSP addendum | 10%              | 5%            | 5%                      | One per piece of sampling equipment    | PFAS-free source water            |
| Aqueous                       | DOC                   | See Area-specific FSP addendum | 10%              | 5%            | 5%                      | One per piece of sampling equipment    | NA                                |
| Soil/Sediment                 | TOC                   | See Area-specific FSP addendum | 10%              | 5%            | 5%                      | One per piece of sampling equipment    | NA                                |
| Soil/Sediment                 | Grain Size            | See Area-specific FSP addendum | 10%              | NA            | NA                      | NA                                     | NA                                |

The frequency will be applied to the entire Area where samples are being collected during an event.

<sup>1</sup> Field QC samples for TOP assay will not be collected.

<sup>2</sup> Equipment rinseate blanks (EBs) are collected by pouring PFAS-free water (supplied by the laboratory) over decontaminated sampling equipment. The frequency of EB collection should be at least once a week per piece of equipment.

<sup>3</sup> Field Reagent Blanks (FRBs) are PFAS-free water poured into a sample bottle in the field at the time of sampling. The frequency of FRB collection is at least once during each sampling event.

## QAPP WORKSHEET #21: FIELD SOPS

The field SOPs associated with the sampling acquisition tasks (including, but not limited to, sample collection, sample handling and custody) are listed in the following table. Copies of the field SOPs are provided in Attachment A.

| Reference Number | Title, Revision Date and/or Number                                  | Originating Organization | Equipment Type  | Modified for Project Work? (Y/N) |
|------------------|---|--------------------------|---|----------------------------------|
| SOP-F001         | Monitoring Equipment Calibration                                    | KGS                      | N/A   | N                                |
| SOP-F002         | Evaluation of Existing Monitoring Wells and Water Level Measurement | KGS                      | Water Level Meter   | N                                |
| SOP-F003         | Groundwater Sampling  | KGS                      | Various Sampling Equipment                                    | N                                |
| SOP-F004         | Sediment-Surface Water Sampling                                     | KGS                      | Various Sampling Equipment                                    | N                                |
| SOP-F005         | Decontamination of Field Equipment                                  | KGS                      | N/A   | N                                |
| SOP-F007         | Field Documentation   | KGS                      | N/A   | N                                |
| SOP-F008         | Sample Handling   | KGS                      | N/A   | N                                |
| SOP-F009         | PFAS Sampling   | KGS                      | Various Sampling Equipment                                    | N                                |
| SOP-F010         | Global Positioning System (GPS) Measurements                        | KGS                      | Trimble, GeoXH  | N                                |
| SOP-F011         | Investigation Derived Waste (IDW) Management                        | KGS                      | Sampling Equipment, 55-gallon drums, bung wrench, drum funnel | N                                |

**QAPP Worksheet #21 - Continued**

| <b>Reference Number</b> | <b>Title, Revision Date and/or Number</b>     | <b>Originating Organization</b> | <b>Equipment Type</b>                               | <b>Modified for Project Work? (Y/N)</b> |
|-------------------------|---|---------------------------------|---|---|
| SOP-F012                | Pore Water Sampling                           | KGS                             | N/A   | N                                       |
| SOP-F013                | Site-Specific Health and Safety Training      | KGS                             | N/A   | N                                       |
| SOP-F014                | Direct Push Technology                        | KGS                             | Various   | N                                       |
| SOP-F015                | Soil Sampling - Surface and Shallow Depth     | KGS                             | Stainless steel equipment, hand auger, core sampler | N                                       |
| SOP-F016                | Private and Water Supply Well Sampling        | KGS                             | N/A   | N                                       |
| SOP-F017                | Monitoring Well Construction and Development  | KGS                             | Various   | N                                       |
| SOP-F018                | Soil Description                              | KGS                             | N/A   | N                                       |
|                         | Geoprobe® Screen Point 22 Groundwater Sampler | Kefr, Inc.                      | GeoProbe  | N                                       |

## **QAPP WORKSHEET #22: FIELD EQUIPMENT CALIBRATION, MAINTENANCE, TESTING, AND INSPECTION**

Field sampling equipment will be leased from a reputable equipment leasing supplier. All equipment shall be received in good working order from the supplier. The field equipment and instruments expected to be used during the sampling events discussed in this QAPP may include:

- Water level meter
- Water quality instrument(s)
- Submersible pump and controller, bladder pump and controller, and peristaltic pump for sample acquisition
- Bladder pump and controller for sample acquisition
- Data logger and transducers
- Power generator
- Trimble GeoExplorer
- Camera

Additional equipment may be needed depending on field conditions. Manufacturer's calibration instructions shall be followed when using rental field equipment. The calibration, maintenance, testing, and/or inspection requirements are discussed in the field specific SOPs included in Attachment A.

## QAPP WORKSHEETS #26 & 27: SAMPLE HANDLING, CUSTODY, AND DISPOSAL

**Sampling Organization:** KOMAN Government Solutions (KGS) Team

**Laboratories:** Test America – Sacramento (PFAS), Test America – Seattle (DOC/TOC), Alpha Analytical (PFAS), and GeoTesting Express (Grain Size)

**Method of sample delivery (shipper/carrier):** Test America - sample courier, sample drop off and/or Fedex overnight, Alpha Analytical – sample courier, GeoTesting Express – sample courier

**Number of days from reporting until sample disposal:** 30 days from invoice

| Activity                         | Description  | Organization responsible for the activity |
|----------------------------------|--|---|
| Sample labeling                  | Sample labels will be affixed to each sample collected to identify the field sample with the following information: unique sample identification number, analytical method, sampler's initials, date and time collected, and preservation method used.   | KGS field team                            |
| Chain-of-custody form completion | <p>KGS will maintain the chain-of-custody records for all normal field and QC samples.</p> <p>A sample is defined as being under a person's custody if any of the following conditions exist:</p> <ul style="list-style-type: none"> <li>• It is in their possession/view;</li> <li>• It was placed in a locked location;</li> <li>• It is in a designated secure area</li> </ul> <p>The following sample information will be documented on the chain-of-custody form:</p> <ul style="list-style-type: none"> <li>• Unique sample identification</li> <li>• Date and time of sample collection</li> <li>• Source of sample (including location/sample ID, and sample type)</li> <li>• Analyses required</li> <li>• Preservative used</li> <li>• Designation of matrix spike/matrix spike duplicate (MS/MSD)</li> </ul> <p>Custody transfer signatures and dates and times of sample transfer from the field to transporters and to the laboratory.</p> | KGS field team                            |

### QAPP Worksheets #26 & 27 – Continued

| Activity                             | Description   | Organization responsible for the activity   |
|--------------------------------------|---|---|
| Packaging and Shipping               | <p>Samples for PFAS, TOC, DOC analysis - Sample containers will be placed inside sealed plastic bags as a precaution against cross-contamination caused by leakage or breakage. Bagged sample containers will be placed in insulated coolers with bubble wrap or other wrapping to eliminate the chance of breakage during delivery or shipment. Ice in plastic bags will be placed in the coolers to keep the samples between 2 and 6 °C throughout storage and shipment. Sample delivery or shipment will be performed in strict accordance with all applicable U.S. Department of Transportation regulations. The samples will be transported from the site to the laboratory by laboratory personnel or shipped to the laboratory by an overnight courier service.</p> <p>Soil samples collected for grain size analysis will be placed in coolers and delivered to Geo Testing Express in Acton, MA or picked up by a courier.</p>   | KGS team, Test America courier, Alpha Analytical courier and/or Geo Testing Express courier |
| Sample receipt, inspection, & log-in | <p>A designated laboratory representative will accept the shipped samples and verify that the received samples match those on the chain-of-custody record. The condition, temperature, and preservation of the samples should be checked and documented on the chain-of-custody form. Any anomalies in the received samples and their resolution should be documented in the laboratory records. All sample information will then be entered into a tracking system, and unique laboratory sample identifiers will be assigned.</p> <p>The laboratory must supply sample receipt confirmation within 24 hours of sample receipt that includes the following:</p> <ul style="list-style-type: none"> <li>• A fully executed copy of the chain-of-custody received with the samples;</li> <li>• Sample acknowledgement and log-in report;</li> <li>• Cooler and sample receipt form noting any problems, breakages, holding time issues, temperature exceedances, or inconsistencies between the chain of custody.</li> </ul> | Test America, Alpha Analytical, Geo Testing Express   |



### QAPP Worksheets #26 & 27 – Continued

| Activity                   | Description  | Organization responsible for the activity           |
|----------------------------|--|---|
| Sample custody and storage | Sample holding-time tracking begins with the collection of samples and continues until the analysis is complete. Holding times for analytical methods required for this project are specified in Worksheet #19 and #30 (Sample Containers, Preservation and Hold Times). Analytical batches will be created, and laboratory QC samples will be introduced into each batch. Samples will be stored in limited-access, temperature-controlled areas.               | Test America Alpha Analytical, Geo testing Express, |
| Sample disposal            | Samples will be stored for 30 days after analysis and reporting, at which time the samples will be disposed of. Organic sample extracts will be stored for 30 days, if sufficient volume remains. The samples will be disposed of by the laboratory in accordance with applicable local, state, and federal regulations. Disposal records will be maintained by the laboratory. SOPs describing sample control and custody will be maintained by the laboratory. | Test America Alpha Analytical, Geo testing Express, |

### QAPP WORKSHEETS #31, #32 & #33: ASSESSMENTS AND CORRECTIVE ACTIONS

Periodic assessments may be performed during the course of the project so that the planned project activities are implemented in accordance with this UFP-QAPP. The routine data quality verification steps described in Worksheet #34 will be used to assess the effectiveness of the project data reporting system. No additional project assessment activities are planned in the project scope. If additional assessments become necessary; this worksheet will be amended as needed.

| Assessment Type                         | Responsible Party and Organization | Frequency  | Assessment Deliverable  | Timeframe of Response                            | Person(s) Responsible for Response and Implementing Corrective Actions  | Person(s) Responsible for Monitoring Corrective Action Implementation |
|---|------------------------------------|--|---|--|---|---|
| Field Procedure Assessment              | Kevin Anderson or designee/KGS     | Weekly   | Internal e-mail   | 1 business day                                   | Kevin Anderson or designee/KGS  | Katherine Thomas/KGS  |
| Field Documentation Reviews             | Lynne Klosterman/KGS               | Weekly   | Internal e-mail   | 3 business days                                  | Kevin Anderson or designee/KGS  | Lynne Klosterman/KGS  |
| Sample Condition Report/ Log in receipt | Laurie Ekes/KGS                    | After sample receipt at laboratory.                            | External e-mail, if laboratory issue.<br>Internal e-mail, if KGS issue. | 24 hours after notification                      | Laboratory log in personnel, if sample ID error, or Kevin Anderson or designee/KGS, if sample collection issue. | Lynne Klosterman/KGS  |
| Analytical Discrepancy                  | Laurie Ekes/KGS                    | After data receipt from laboratory and during data validation. | External e-mail   | 7 business days                                  | Jerry Lanier/Test America<br>Jim Occhalini/Alpha Analytical<br>Mark Dobday/GeoTesting                           | Laurie Ekes/KGS   |
| Data Validation Reports                 | Laurie Ekes/KGS                    | Prepared for each Sample Delivery Group (SDG).                 | Data Validation reports and validated data spreadsheet per SDG.         | 3 weeks after receipt of completed data package. | Laurie Ekes/KGS   | Katherine Thomas/KGS  |



## **APPENDIX B**

### **Responses to Comments - reserved**